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GEO. H. CROSBY
Duluth mining man recently elected a director of the American Mining Congress

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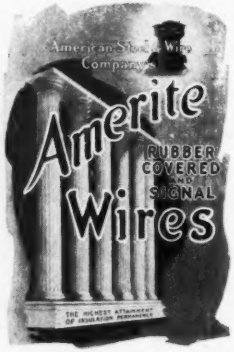

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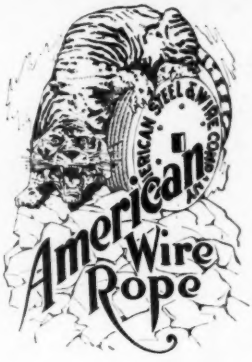

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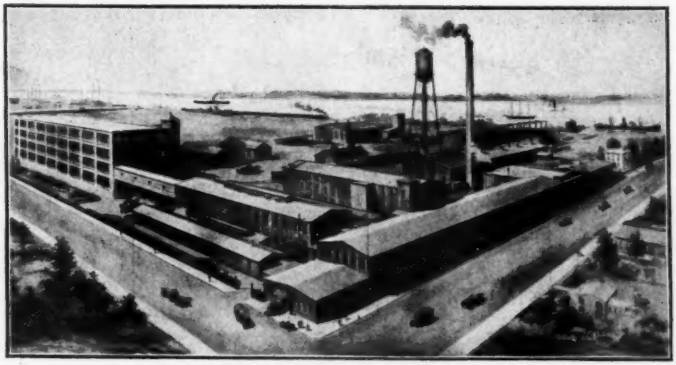

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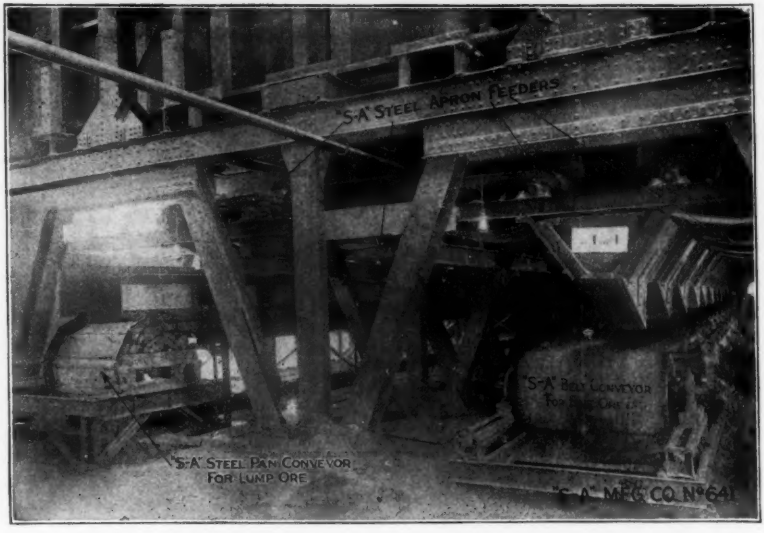

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THE MINING CONGRESS JOURNAL

Official Organ of the American Mining Congress

BUSINESS COMBINATIONS UNDER FEDERAL SUPERVISION

The United States Chamber of Commerce has submitted to its constituent bodies a report of a special committee on combination as related to natural resources. This committee consisted of W. L. Saunders, New York; Wm. B. Clark, Baltimore; John H. Fahey, Boston; Chas. R. Van Hise, Madison, and Chas. S. Keith, Kansas City, and the proposition as submitted is as follows:

"The committee recommends that there should be remedial legislation to permit cooperative agreements under Federal supervision in those industries which involve primary natural resources, on condition that the agreements in fact tend to conserve the resources, to lessen accidents, and to promote the public interest."

The committee report reviews the history of the development of natural resources, calls attention to the loss of life and limb by industrial accidents points out the fact that competition which increases waste of natural resources and heightens danger to life and limb among operatives has grown in breadth and intensity, and calls attention to the peculiar conditions existing in the production of coal and the great waste now prevailing. The recommendation of the committee is in full accord with the views of the American Mining Congress, looking to cooperative agreements under Federal supervision. It is believed that the commercial bodies of the country who vote on these propositions will see the importance of cooperation as a means of bringing the business force of this country to a state of greater efficiency. We call attention to an excerpt in another column from a recent monograph on industrial efficiency by Dr. Slossen, which presents, as we believe, very clear reasons for the indorsement of the recommendation of the committee of the United States Chamber of Commerce.

COMPULSORY INVESTIGATION OF INDUSTRIAL DISPUTES

Much of the criticism against President Wilson, because of his activity in bringing about the passage of the Adamson eight-hour bill, will be turned to praise if the same forceful measures shall be exerted in behalf of a passage of a compulsory investigation act. It will be recalled that President Wilson's program called for "An amendment of the existing federal statute which provides for the mediation conciliation and arbitration of such controversies as the present by adding to it a provision that, in case the methods of accommodation now provided for should fail, a full public investigation of the merits of every such dispute shall be instituted and completed before a strike or lockout may lawfully be attempted."

This program included:

An enlargement and administrative reorganization of the Interstate Commerce Commission; the establishment of an eight-hour day as a legal basis of work and wages; the appointment of a committee to report on the results of the operation of the eight-hour law; approval of the consideration by the Interstate Commerce Commission of an increase of freight rates, to meet the additional expense entailed by the enforcement of the eight-hour law.

The eight-hour law was enacted and its counterpart, the investigation act, now awaits action of Congress.

The first part of this program received the approval of labor leaders and was passed under conditions which were condemned by many upon principle and by others because the bill was forced through Congress to prevent a railroad strike which was threatened unless the bill should be immediately passed. The second part of the program does not meet the approval of labor leaders and it remains to be seen whether organized labor is the dominant political factor in the Government or whether Congress is ready to demonstrate the opposite by putting into effect President Wilson's suggestion "That the concerted action of powerful bodies of men shall not be permitted to stop the industrial processes of the nation." The principal involved in this suggestion is not new nor experimental. It has been exercised in other countries with great benefit. The State of Colorado enacted a similar law which has been in operation for two years with very beneficial results. A very complete description of the Colorado law and of its workings will be found in the proceedings of the nineteenth annual convention of the American Mining Congress in a paper by Mr. Wayne C. Williams, a member of the Colorado Industrial Commission. We urge our readers to give critical study to this address.

THE MINING CONGRESS JOURNAL believes in compulsory arbitration of every industrial dispute in which the rights of the public are greater than the rights of the disputing parties.

Surely some provision should be made by which disputes vitally affecting the public interest shall be investigated in advance of the inevitable bad results, in order that the public, the final arbiter, shall be in position to exercise its power intelligently.

AN ANOMALOUS SITUATION

One of the most important, if not the most important, of public questions is that involved in what is known as the public land question of the West. This subject is now and for years has been under consideration by Congress. At one time the West was represented by those whose interest was that of the public wholly. A great basic principle is involved—is the Government of the United States to forsake the policy under which the pioneer was rewarded for the risks and hardships which he assumed, whether the States are to have the right to tax the property within their borders, whether the citizens of those States are to be tenants of the Federal Government or to be free holders, whether western development is to be controlled by the pioneers upon the ground who understand conditions or whether this development is to be controlled by a Congress 2,000 miles away and so unwieldy that nothing short of a most terrible public emergency could secure its action upon any point within a space of two years, or, worse still, whether that control shall be placed in the hands of Bureaus at Washington, where the details of executive management are controlled by low salaried clerks with absolutely no knowledge of western conditions. These are some of the problems involved in the discussion; however, these questions seem to have been largely lost sight of. The present situation would indicate that the only questions involved are the rights of individual investors, whose property is threatened by the proposed legislation. So far as the public is concerned, the great fundamental questions involved are being neglected. A few of the western Senators and Representatives have been and are making a valiant fight against the radical changes proposed, but these men are not receiving the support and assistance from the West which so vital a question should command. The interests of the West are being largely left to the efforts of those who are within the "domain of reprisal."

NATIONAL EFFICIENCY

Monograph number two of the National Institute of Efficiency has been issued and is well worth a careful study. Its author is Dr. Edwin E. Slosson of the editorial staff of the *Independent*. The subject of "Trade Expansion and National Independence" is treated compre-

hensively and it is pointed out that the importance of economic independence is the chief lesson of the great war.

This monograph is an able argument in support of the plan urged by Dr. W. R. Whitney of the Research Department of the General Electric Company at the Chicago convention of the American Mining Congress looking to appropriations for scientific research in industrial fields.

Dr. Slosson calls attention to Dr. Friedrich Naumann's *Mitteleuropa* in which Germany's unique power in the industrial world is credited mainly to—

1. An incorruptible and efficient body of administrators;
2. A well organized and disciplined body of workmen;
3. An unequalled body of scientists and technicians;
4. An exceptionally able group of financiers and organizers of large scale industry.

Dr. Slosson points out the radical differences between German methods and our own in the following language:

"The American Government intervenes in business to prevent combinations and restore competition.

"The German Government intervenes to prevent competition and to restore combination. Even the labor men and sociálists of Germany favor the formation of syndicates because it makes the conditions of employment more stable and increases wages and number of men employed through expanding the industry. The industries which have made most progress in Germany have been those most completely syndicated. like the steel, potash, dyes and glass business. But the form of combination favored in Germany is not the American trust, but the cartel, which is essentially a marketing syndicate, regulating prices, output and share of production. The cartel does not destroy or absorb small producers, but, on the contrary, enables them to survive by protecting them from the competition of the big ones.

In America protective duties are attacked on the ground that they favor the formation of trusts. In Germany they are advocated for that same reason. Our Government prohibits railroad rebates in behalf of special industries. The German Government grants rebates or manipulates freight rates on the State railroads to help industries that are endangered or are ambitious of foreign expansion. In this country it is regarded as an unanswerable argument against the tariff if it is discovered that a protected article is sold cheaper abroad. In Germany duties are imposed with the express purpose of enabling the manufacturer to sell cheaper abroad. In this country it is considered an absurdity, if not a crime, to maintain a duty on a product, especially agricultural, which can never hope to be produced as cheaply as it can be imported. In Germany it is reagrded as the duty of the Government to permanently protect an industry like agriculture, which is necessary for the economic independence of the State. In America it is thought desirable that the different branches of an industry be kept in separate hands. In Germany it is thought desirable that each industry should control all its sources of raw material and turn out a completely finished product; for instance, that a steel plant should own its own iron mines, coal mines, railroads and ships. Our cities are ruled strictly and in detail by the States; the German cities are self-managed and branch out into many enterprises considered improper in America. In Germany office-holding is a life job for which a man receives professional training; we regard administration as an occupation for amateurs and believe in rotation in office.

"Americans think it wrong for any department of the Government to make a profit. The German Empire gets over 30 per cent of its income from its remunerative enterprises, and the annual gross receipts of Empire and States from such sources are $700,000,000. In America the combination of railroads and steamship lines is forbidden; in Germany it is encouraged. The German Government is the partner and promotor of German business; the American Government aims rather to regulate, to correct and to chastise. In short, the German strives for organization; the American for disorganization. The German ideal is cooperation; the American is competition. The Germans believe that competition is a sort of industrial warfare, and as such should give place to a permanent peace."

If the temper of our recent convention at Chicago is at all indicative of the present mood of American business men it would seem to promise a return to the cooperative spirit as a real factor in our future industrial life.

A SEVEN-HOUR DAY

During the despondent days of the bituminous coal mining industry, many plans were considered for the betterment of conditions. Miners employed less than two hundred days each year required a much higher wage than if employment could be made continuous. What seemed to be the best plan considered was that through cooperative agreements, among the operators and miners, conditions could be created under which the miners should have more continuous employment and that those workmen thus relieved from service might

devote their energies to the production of articles needed by the miners, particularly foodstuffs, in order that the miner's living expenses might be reduced by purchasing his supplies at a less price; that through this plan the miner might during the year earn a surplus above the actual cost of living and the coal consuming public either receive its coal at a less price or through the saving thus effected leave to the operator a reasonable profit upon his operations.

Pres. John P. White, of the U. M. W. of A., speaking from the miners' standpoint and apparently without regard to the public interest is advocating a seven-hour day as the best solution of this problem.

There are approximately 550,000 men engaged in the bituminous coal mining industries in the United States. Upon a basis of $2.00 per day, the proposed reduction in hours would mean an additional burden upon the coal consuming public of $28,600,000.00 annually. The greater part of this burden would rest upon productive industries in other lines.

The result would be that the wage earners who furnish the supplies to these miners would be obliged to charge a higher price in order to enable them to earn the additional $28,000,000 burden.

It would seem to be a much more effective solution of this problem if we could put the 60,000 men into some other productive line of industry, for instance, the raising of farm produce, and, through the increased competition in the produce market, enable these remaining miners to live more cheaply.

THE MINING CONGRESS JOURNAL does not believe that any plan can be effective except it makes for greater efficiency.

Let us provide continuous employment for the men who are necessarily engaged in mining, furnish them with that equipment which will enable them to produce coal most cheaply and utilize the surplus labor in an effort to cheapen the cost of living.

Only through the highest efficiency can we hope to continuously provide an adequate wage to these workmen; namely, a wage which will permit him to support his family as befits an American workman, to educate his children and to provide a competency for his old age during the working period of his life.

No plan can be made permanently effective which undertakes to relieve the burdens of one part of society by placing those burdens upon another part. A recent statement by President Wilson is clearly to the point. The statement is as follows:

"We must cooperate in the whole field of business; the Government with the merchant, the merchant with his employes, the whole body of producers with the whole body of consumers, to see that the right things are produced in the right volume and find the right purchasers at the right place and that all, working together, will realize that nothing can be for the common benefit which is not for the individual benefit."

WATER POWER DEVELOPMENT

The recent embargo by the Canadian Government against the transmission to plants operating in the United States of electrical power development upon the Canadian side of Niagara Falls, furnishes a peculiar reason for a protest against the administration policies through which water power development in the western States is being prevented.

The appeal to the United States Senate that legislation shall be enacted permitting the use of a larger part of the water from the Niagara River in the development of power upon the American side of the Falls comes from many parts of the country. From Los Angeles, Cal., comes the appeal from various manufacturers and from the mining interests to the effect that this shortage of power at Niagara Falls is curtailing their supply of grinding materials used in the manufacturing plants and of cyanide used in the mining industry. This shortage of power would have been supplied many times over before this time by each of several water power producing companies in the western States had the policy of the Federal Government tended to encourage development instead of preventing development and of attacking the foundation upon which investments already made were based.

As an illustration of this we call atten-

tion to the case of *The United States of America* vs. *The Colorado Power Co.* Equity case number 5853 in the District Court of the United States for the district of Colorado.

Development on this project began fifteen years ago.

The rights of the promoters of this enterprise were approved by the proper officers of the Government and several millions of dollars have been spent in construction. In 1909, seven years after the beginning of this work the Federal administration began its attack upon the enterprise and after years of contest the case was finally brought before the court. The case is still pending, the securities of the company have been and are still in jeopardy, many good faith investors have lost a large part of their investment and during all these years. hydro-electric power of enormous value has been and is being continually wasted in the name of conservation. A chronological history of the material events in this case will be both interesting and instructive.

January 7, 1902, date of commencement of construction, as fixed by decree of District Court of Eagle County;

June 2, 1902, Deremer filed application for United States rights of way;

July 21, 1902, the Grand River Power and Transmission Company filed application for United States rights of way;

August 20, 1903, Deremer's right of way maps approved by the department;

November 19, 1905, The Grand River Power and Transmission Company's right of way maps approved by the department;

April 26, 1905, prior to this date the defendant's predecessors had expended approximately $20,000 in surveys and construction work;

April 26, 1905, defendant's site withdrawn by Secretary of the Interior for Holy Cross Forest Reserve;

August 25, 1905, original proclamation of the Holy Cross Forest Reserve;

December 26, 1906, defendant acquired Deremer's rights and the rights of The Grand River Power & Transmission Company, through mesne conveyances;

December, 1906, defendant commenced expenditures at Shoshone;

March 1, 1907, the defendant's expenditures at Shoshone prior to this date, $61,158.56;

March 1, 1907, the President's proclamation purporting to include the defendant's site in Holy Cross Forest Reserve;

July 16, 1907, the Secretary of the Interior assented to the use by the defendant of the Deremer and The Grand River Power and Transmission Company's rights of way;

July 1, 1908, at this time there had been invested in the construction of the Shoshone project $980,297;

March 1, 1909, the defendant's expenditures at Shoshone, prior to this date, $2,297,091.94, and a further investment of approximately $5,000,000 made in other construction, the use of which is dependent on the Shoshone development;

March 2, 1909, attempted revocation of the Deremer and The Grand River Power and Transmission Co.'s rights of way by Secretaries of the Interior and of Agriculture, to take effect July 1, 1909;

June, 6 1909, Shoshone works completed and in operation;

July 26, 1909, Secretary of Agriculture attempted a further revocation of Deremer and The Grand River Power and Transmission Co.'s permits.

This is but one of many cases of this kind in which money already invested by those who believed that their Government would deal justly with its citizens has been jeopardized.

The writer was recently told by a gentleman who has large opportunity for knowing the truth that at this time he knows of over $300,000,000 ready to make investments in the development of western water power enterprises could fair treatment be assured. The benefit to the Western States and to the nation, if power from a $300,000,000 investment could be applied to western productive manufacturing and mining enterprises, can hardly be estimated.

Fundamentally the difficulty arises from the fact that the Federal Government is

claiming the right to control these lands as a sovereign and not as a proprietor.

Congress many years ago recognizing the fact that the Government cannot be made a party defendant in legal proceedings enacted laws permitting the use of the public domain for public utilities. The power was given the Interior Department to supervise filings of this character in order that conflicting rights of way should be harmonized and that no property should be unduly burdened with easements of this character. At the time the final decision of these matters was very properly given to the Interior Department, it became the duty of the department to decide only between rival claimaints for the same rights of way. When, however, the Government became an interested party seeking to retain its ownership and through a leasing system receive royalties therefrom the Government should not be permitted to render final decision. Justice cannot be assured or even hoped for when one of the parties to a contest is given the right of final decision.

If Congress is desirous of conserving the water power resources of the United States it will immediately enact legislation through which the water powers of the West may be developed. If Congress believes that our Government shall be just it will insist that the rights of investment made in good faith shall be fairly and equitably construed.

PROCEEDINGS 1916 CONVENTION

The proceedings of the nineteenth annual convention of the American Mining Congress will be ready for delivery probably by January 15, and will present a most notable collection of economic discussions by leaders in the various lines. The volume will consist of from 600 to 800 pages and include the following papers:

Arnold, Ralph.—The World's Oil Supply.

Ball, Max W.—Adequate Acreage and Oil Conservation.

Bishop, Roy A.—Remedial Legislation for Benefit of Oil Companies.

Crews, Ralph.—Cooperation in the Marketing of Coal.

Cushing, George H.—What Becomes of the Benefits of Production Efficiency.

Day, David T.—The Chemical Possibilities of Petroleum.

Dering, C. L.—World Trade Conditions of the Future.

Drinker, Dr. Henry S.—Position of Engineers Towards the Question of Water Power Development in the West.

Fay, Albert H.—The Record of Mine Safety Work.

Gamble, Judge J. G.—Authority of States to Tax Mining Property on Indian Lands.

Gann, Thomas M.—Responsibilities and Duties of the Operator in Mine Safety Work.

Garcia, J. A.—Uniform Legislation as Affecting Mining Engineering.

Gillett, Hon. James N.—The Relation of the Federal Government to Western Oil Production.

Harlin, Robert H.—Is Uniform Coal Mining Legislation Advisable?

Hurley, Hon. Edward N.—The Federal Trade Commission and the Mining Industry.

James, Garrett B.—Oil Storage.

Kirby, E. B.—Report of Committee on Revision of Mineral Land Laws.

Lewis, T. L.—Responsibilities and Duties of the Miner in Mine Safety Work.

Lyon, Dorsey A., and Ralston, O. C.—Present Status of the Oil Flotation Process.

Manning, Van H.—What Can Uniform Mining Legislation Hope to Accomplish?

Manning, Van H.—Federal Aid to Mining Efficiency.

Mooreshead, A. J.—Commission Plan of Preparing Mining Legislation in the State of Illinois.

McDowell, J. C.—Geology In Its Relation to the Oil Industry.

McNair, Dr. F. W.—Responsibilities and Duties of the Public in Mine Safety Work.

Parker, E. W.—Cooperation, Conservation and Competition in Coal.

Paul, James W.—Desirable Points of Similarity in Mining Legislation.

Paul, James W.—The Duties of Mine Inspectors.

Pope, Col. George.—Organized Capital and Organized Labor and Their Relation to Efficiency, Conservation, Better Wages, Better Living Conditions, Lawlessness, Strike Disorders and Industrial Freedom.

Potter, Charles F.—Conservation in Mining Through Water Power Development.

Purdue, A. H.—The State Geologist and Conservation.

Rittman, Dr. Walter F.—Dyes and Explosives from Coal and Petroleum.

Roosevelt, Hon. Franklin D.—Naval Oil Reserves as a Necessity to National Preparedness.

Ropiequet, R. W.—Coal Freight Rates, Relatively and Uniformly.

Ropiequet, R. W.—Difficulties I Have Met In Coal Litigation.

Ruhl, Otto.—A Tariff for Revenue as Related to a Compensating Duty on Lead and Zinc Ores.

Scholz, Carl.—Cooperation the Basis of Safety, Efficiency and Conservation.

Scollard, Michael.—The Commission Plan of Preparing Mining Legislation in Indiana.
Sharpless, F. P.—Revision of U. S. Land Laws as They Affect Mineral Location.
Short, Hon. Frank H.—Conservation: Its Purpose, and Its Effect.
Short, Hon. Frank H.—The Federal Government in Its Relation to the Public Lands of the West.
Siebenthal, C. E.—Lead and Zinc Resources of the United States.
Smith, George Otis and C. E. Lesher.—The Cost of Coal.
Stander, H. J.—Oil Flotation.
Stock, Dr. H. H.—State Mine Rescue Station.
Taylor, S. A.—Advisability of Preparing Mining Legislation Through Commissions.
Taylor, S. A.—Committee on Uniform Cost Accounting.
Thompson, J. W.—Methods for Obtaining a Uniform Mining Law.
Titus, Louis.—The Federal Government and the California Oil Claimants.
Traer, Glenn W.—The Sherman Law and Its Relation to Mining.
Tupper, C. A.—Mining Industry; Its Magnitude.
Van Wagenen, Theo. F.—The Prospector and the Mining Law.
Welch, R. L.—Practical Phases of the Standard Oil Dissolution and the Necessity of Combinations Among Independent Producers to Meet Unfair Competition.
White, I. C.—Anti-clinal Theory.
Whitney, Dr. Willis R.—Practical Significance of Pure Research.
Williams, Wayne C.—Compulsory Investigation of Industrial Disputes Under the Colorado Industrial Commission.
Willis, Prof. C. F.—The Value of State Mining Organizations.

Many of these papers are classics upon the subjects considered and taken in connection with the discussions which followed their presentation bring out the best thought of the present day.

The proceedings will be sent to all members of the Mining Congress, and to members of the U. S. Senate and House of Representatives.

MINERALS SEPARATION VICTORY WELL DESERVED

Mining engineers and metallurgists in Washington are of the opinion that there was not the slightest miscarriage of justice in the decision of the Supreme Court in the Minerals Separation Case. From such opinion from the mining camps of the country as has been reflected in the Capital, there seems to be a general concurrence in the decision reached by the highest tribunal. This sentiment, as well as the opinion of the court, is incontrovertible evidence that justice and fair play are well developed American attributes. The decision of this case in favor of the two English syndicates that were plaintiffs means that millions in royalties will go to a foreign country.

The remarkably clear setting forth of the case by Mr. Justice Clark in the opinion, which is reproduced in full on another page, is making the fundamental questions involved well understood. The royalties will be paid ungrudgingly and mine operators throughout the country are glad to see some measure of confidence restored among inventors. The difficulty of those inclined toward invention of securing the fruits of their work and their genius has been retarding this class of endeavor.

We hope the attitude of the Minerals Separation, Ltd., and Minerals Separation, American Syndicate, will be cordial and generous toward the operators of mines. They will gain by such a policy and so will the operators.

GEORGE S. RICE SERVES CANADIAN GOVERNMENT

George S. Rice, chief mining engineer of the Bureau of Mines, has reflected credit on himself, the Bureau with which he is connected, and on his country by the very excellent work he has just completed at the request of the Canadian Government. He has just returned from an examination of the coal mines in the Crow's Nest field of British Columbia. During a short visit he was able to grasp a situation which has been baffling the best of engineers. While his report is hardly begun he was able to hold out definite hope to the operators of what are perhaps the most gaseous mines in the world. That his report will be of material aid toward the continued operation of these much needed sources of coal supply, under conditions offering a minimum of life risk, is a foreformed conclusion we do not hesitate to venture.

GEOLOGISTS ARE GIVEN WHOLESOME COUNSEL

Good advice is given geologists by George Otis Smith when he urges them not to accept professional work in the service of one of the parties to litigation.

When one geologist of reputation appears in court and attempts by his testimony to offset the testimony of another geologist, it frequently besmirches his profession.

There is no cleaner, higher-planed profession than that of the geologist. Each member of the profession should do his part and use his influence to avoid any lowering of the standard.

Concerted action on the part of all geologists in an effort to procure legislation looking to the retention of expert witnesses by the court should be undertaken.

Postal Statement

Complying with the postal law of August 24, 1912, THE MINING CONGRESS JOURNAL submits the following information to its readers: THE JOURNAL is published monthly at 744 Munsey Building, Washington, D. C. Editor, J. F. Callbreath, business manager, J. F. Callbreath; publisher, The American Mining Congress; owners, The American Mining Congress. There are no stockholders or bondholders. (Signed) J. F. Callbreath, editor. Sworn to and subscribed before me this 3d day of October, 1916, L. D. Keller, Notary Public.

FUND BEING COLLECTED FOR SAFETY ASSOCIATION

The Joseph A. Holmes Safety Association is engaged in an intensive campaign, looking to the collection of funds to carry out the purposes for which it was organized. This association which is a form of memorial to the late Dr. Holmes, is intended to promote safety in the mineral industry. One of its principal activities will be the recognition of notable efforts toward greater safety in mining operations. The funds for this purpose are being collected by popular subscription among those directly interested in the industry.

OUR GREAT GRANDCHILDHEN WON'T WANT TO PAY THE INTEREST

"The consumer of the next century simply cannot afford to have private capitalists invest today in coal land fo their great grandchildren to lease." (Extract om the address of Geo. Otis Smith at the Min..g Congress Convention.)

FATALITIES IN MINES COMPARE FAVORABLY WITH THOSE OVERTAKING MEN IN RAILROAD TRAIN SERVICE

That fatalities occur with greater frequency among trainmen on railroads than they do in the bituminous mines of Pennsylvania is a striking fact brought out by Albert H. Fay, statistician of the Bureau of Mines, in a report recently published. When it is considered that the major portion of the work of trainmen is in daylight; and wholly on the surface, this is an indication that the hazards of coal mining are not as great as is popularly supposed. It is true that the fatality rate in the anthracite mines is higher than the fatality rate among trainmen, but this is due to the well known fact that the veins in the anthracite fields pitch at sharp angles, which greatly increases the danger to which the miner is subjected.

DR. CHAS. E. VAN BARNEVELD GETS TUCSON APPOINTMENT

Dr. Charles E. Van Barneveld, one of the best known metallurgists in the Southwest, has been appointed superintendent of the federal mining experiment station at Tucson, Ariz. Dr. Van Barneveld is best known, perhaps, as the former director of the Mining Department of the University of Minnesota; but, his specialty for many years has been the study of mining and metallurgical problems in the southwestern portion of the United States. Dr. Van Barneveld had charge of mining at the University of Minnesota for thirteen years. Prior to this time, however, he was engaged for five years in mining operations in the Southwest and in Mexico. During his long period of service at the Minnesota University he spent several months each year in the southwestern states, making personal studies of its mining problems.

When it became necessary to fill the important place at the head of the Department of Mines and Metallurgy of the Panama-Pacific Exposition, Dr. Van Barneveld was so preeminently the man for the place that he was chosen without dissension by the management of the exposition. For a year after the close of the exposition he served as Professor of Mining at the University of California.

Dr. Van Barneveld was in Washington last month, familiarizing himself with the manner in which the Bureau of Mines conducts its work. He also has visited the stations and branches of the Bureau of Mines with the same object in view.

The chief clerk of the Tuscon Station will be H. E. Meyer.

Bent Elected President

At a recent meeting of the Illinois Coal Operators' Association, E. T. Bent, of Chicago, was elected president, Rice Miller, vice-president, and F. C. Honnold, secretary and treasurer.

FIVE WESTERN STATES PAY OVER $100,000,000 IN MINE DIVIDENDS

Arizona, Utah, Montana, Nevada and Idaho Mines Divide Enormous Profits of the Year Just Closed—Output of Copper Reaches Undreamed-of Total of 2,000,000,000 Pounds

Ten mines in Arizona paid $34,000,000 in dividends during the past year. Adding Utah, Montana, Nevada and Idaho dividends to those of Arizona we have a total of over $100,000,000 in dividends paid out of the mines of these five western States in a single year.

These are some of the impressive facts brought out by the report of the Geological Survey to Secretary Lane just made. "Never before," said Mr. Lane, "has so large a draft been made on the natural resources of our country as during this year, and never before have the metals been extracted from these ores with less waste or utilized to better advantage in advancing the general prosperity of the country. Even as written in the plain figures of 1916 production the wonderful record of our mines sets forth a degree of national industrial independence only hoped for a few years ago.

"Again copper stands out as the best illustration of how American mines can meet a world demand. The output of nearly two billion pounds of the red metal is double that of ten years ago and its value is twice that of the copper produced in 1915. Add to this the facts that in value copper now contends with iron for first place among the metals and that together the amount of these two metals produced last year had a value of more than one billion dollars, and we have a measure of what this country can contribute in useful metals.

"The output of zinc from domestic ores increased last year 95,000 tons, which makes a new record for that metal, the total value of spelter from United States ore being $135,000,000. Lead also shows a large increase, the $75,000,000 output being a gain of more than 50 per cent.

"With all this activity in metal production the coal mines have had to meet a heavy demand, so that the bituminous coal output has now passed the half-million ton mark, an increase of 12½ per cent over the previous year. Coke production increased 30 per cent and it is gratifying to note that by-product coke made the largest gain, which means a corresponding gain in benzol and other valuable by-products.

"Again the oil wells have given a new record for petroleum yield, the estimate of marketed production of crude petroleum for 1916 being 292,000,000 barrels, or 11,000,000 barrels more than in 1915.

"Another mineral product which furnishes an index to business conditions is cement, the 1916 production of which is estimated to be 5,000,000 barrels in excess of the output of the previous year, while the shipments were even greater, aggregating 94,500,000 barrels, with the outlook reported as good for the new year.

"The reports received from the Survey's western offices contain most significant mining records. Every western State shows a large increase in yield of metals, Arizona leading with a gain of $100,000,000 over last year, while Utah and Montana together report another $100,000,000 gain. Alaska also had its best year, contributing a total value of more than $50,000,000 this year, or over 50 per cent in excess of any previous year.

"These advance statements not only show that 1916 marks a new advance for the mineral industry of the country, but this remarkable increase promises to be approximately 25 per cent over the 1915 production, so that we may expect the final figures to show a total of three billion dollars."

EXPECT GREATLY INCREASED ZINC OUTPUT IN 1917

At both the Mammoth and Bully Hill mines in California, processes have been developed for reducing zinc ores by leaching and electrolytic precipitation of the zinc. These processes will also be applicable to the bag-house dust, and will doubtless operate to increase greatly the output of zinc by 1917.—(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

RECORD BREAKER FOR COKE

The coke output of the United States broke all records in 1916. More than 35,000,000 tons of beehive coke was manufactured, an increase of over 27 per cent compared with 1915, and 500,000 tons more than the record-breaking total in 1910. By-product coke amounted to 19,200,000 tons, an increase of more than 5,000,000 tons, or 36 per cent compared with 1915. The total coke production, according to estimates prepared by C. E. Lesher, of the United States Geological Survey, Department of the Interior, was 54,300,000 tons, an increase over 1915 of 12,700,000 tons, or 30 per cent, and over 1913 of 8,000,000 tons.

COAL TRADE ASSOCIATIONS PLAYING IMPORTANT PART IN THE INDUSTRY

Increase in Efficiency and in Numbers of These Organizations Is One of the Features of the Year Just Closed—Public and Operators Are Being Benefited by Their Work

One of the most striking developments in the coal business during 1916 has been the development of the coal trade associations, according to C. E. Lesher, coal statistician of the U. S. Geological Survey, who has just returned from an extended trip. These associations during the current year have reached a higher degree of efficiency than ever before and a large number of new associations have been formed. In Mr. Lesher's opinion many more associations of this type can be formed. He thinks each competitive district would benefit by having an organization of this type.

In the collection of trade data and the prompt compilaton of statistics, these associations are giving the operators facts on which to base their business activities which plan is taking the place of the former method of basing them on hearsay and other indefinite information. The quality of the work that is being done and the progressive policies, which are characteristic of these associations, are doing much to benefit the operators, but by increasing the stability of the industry, Mr. Lesher believes that the public is being benefitted importantly.

Much of the success of these associations is due to the men who are in direct charge of them. Men of the type of Dr. F. C. Honnold, C. G. Hall, T. L. Lewis, W. D. McKinney and W. H. Groverman are doing much to make these associations of practical every-day value. The work being done by the Franklin County Coal Operators' Association, The Northwest Coal Dock Operators' Association and the Indiana Coal Trade Bureau is typical of the high type of endeavor, Mr. Lesher believes.

Mr. Lesher visited Cincinnati, Columbus, Chicago, Minneapolis, Duluth, Cheyenne, Denver, Colorado Springs, Kansas City, St. Louis, Terre Haute and Cleveland.

OKLAHOMA ZINC PRODUCTION INCREASES DUE TO NEW MINES

There will be a larger production during 1916 from the southwestern part of the Joplin region, which lies in Oklahoma, where several very rich mines have been recently opened. These mines are in the northward extension of the Miami district, in which development has progressed northward to the Kansas line. Just at present the most actively prospected section in the Joplin district is an area in Kansas 2½ miles wide and reaching from Baxter Springs 8 miles westward, adjacent to the Oklahoma State line. —(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

KEEN INTEREST IN FIRST AID WORK IN ANTHRACITE FIELD

The wide interest shown in first-aid work in the anthracite mines by officials and employes alike has been forcibly demonstrated through the contests conducted by the operating companies during the late summer and fall. The efficient practical work done by these volunteer "doctors" in times of stress has won general recognition. Equally to their credit is the highly technical skill exhibited on these field days under the critical scrutiny of eminent surgeons. Although these competitions had provided problems involving the treatment of the most serious classes of accidents, the men exhibited the highest efficiency. No less than four contesting teams had the good fortune to make perfect records, being each rated at 100 per cent. Three more first honors went to teams representing that many of the large companies upon the mark of 991/3 per cent. The thoroughness with which the contestants worked is further indicated, in one competition in which ten teams were entered, and in which the lowest rating was 96.7.

The popularity of these meets was responsible for an aggregate attendance of more than 7,000 persons, among whom were many distinguished guests. There were 132 teams represented and there was a total of 743 men in competition. The winning teams, apart from the joy of carrying off the coveted honors, were accorded valuable prizes. There were six gold cups awarded and some of the fortunate contestants received in addition money prizes, gold watches, jewelled stick pins, gold and bronze medals, and some of the men were treated to special vacation trips. Besides these contests most of the companies had arranged athletic programs and valuable prizes went to the winners in the various events. Bands accompanied most of the excursionists to the fields, dinners were served to all in attendance and dancing was provided as a relaxation after the more serious program had been completed.

Tennessee Will Increase Zinc Output

The zinc output of Tennessee during 1916 will be larger than 1915, because the Mascot mines are increasing in production and because a new mill equipped with flotation machines has been operating all the year at the New Prospect mine, in the old Lead Mine Bend district.—(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

MINERALS SEPARATION, LTD., WINS CASE BEFORE THE SUPREME COURT

Opinion Involving Millions in Royalties is Handed Down by Nation's Highest Tribunal—Patents of English Company Held To Be Valid in Their Important Claims

While the Supreme Court of the United States decided the case of Minerals Separation, Limited, and Minerals Separation American Syndicate, Limited, *vs.* James M. Hyde, in favor of the English companies it is a generally expressed belief here that the litigation has resulted in benefit to the mining industry in the United States. Minerals Separation began operating in this country convinced of the fact it could absolutely dictate any terms it saw fit to those in need of its process. Its business methods were of a sort which stirred up intense antagonism. The English company was accused of being arbitrary to an extreme in many of the contracts which it sought to make.

That the unbending business policy of this company is responsible for much of the progress which has been made in the United States in leaching, is asserted by prominent metallurgists here. It doubtless stimulated experimentation in other forms of treatment for ores. It is doubtful if the leaching process would have received much consideration at Anaconda if it had not been for the arbitrary attitude of Minerals Separation.

Threatened by litigation, which for a time, at least, promised to undermine all of the claims of its patent, Minerals Separation adopted a more cordial business policy. From that time on its relations with American mining concerns have been very much more conducive to cooperation. A desire has sprung up recently that the company reap the rewards of its painstaking investigation and development of flotation.

The final decision in the case, which was handed down, December 11, by the Supreme Court, came after the matter had been considered by the District Court and the United States Circuit Court of Appeals in Montana. The District Court returned a verdict very favorable to Minerals Separation. Its ruling, however, was largely set aside by the Court of Appeals. In turn the Supreme Court overruled most of the conclusions of the Court of Appeals but it does not concur in all of the findings of the District Court.

The opinion in this important case was written by Justice Clarke. There was no dissenting opinion. The Supreme Court handled this most complicated case in a highly intelligent manner, according to authorities here, and the opinion is regarded as a very masterly piece of work.

Owing to the widespread interests in the Minerals Separation case the entire text of the opinion is reproduced as follows:

In this suit the complainants, the first named as the owner and the other as general licensee, claim an infringement of United States letters patent No. 835120, issued on the sixth day of November, 1906, to Henry Livingstone Sulman, Hugh Fitzals Kirkpatrick-Picard and John Ballot. The usual injunction, accounting and damages are prayed for. The District Court sustained the patent as to claims numbered 1, 2, 3, 5, 6, 7, 9, 10, 11 and 12; found that the defendant had infringed each of these claims, and granted the prayer of the petition. The Circuit Court of Appeals for the Ninth Circuit reversed the decree of the District Court and remanded the case with instructions to dismiss the bill. The case is here on writ of certiorari to review that decision.

As stated in the specification, the claimed discovery of the patent in the suit relates "to improvements in the process for the concentration of ores, the object being to separate metalliferous matter from gangue by means of oils, fatty acids, or other substances which have a preferential affinity for such metalliferous matter over gangue."

The answer denies all of the allegations of the bill and avers that in twenty-five designated United States and five British patents the process described in suit was "fully and clearly described and claimed," and it also avers that the claimed discovery was invented, known and used by many persons long prior to the time when the application was made for the patent in suit. Notwithstanding this elaboration of denial counsel for the defendant in the summarized conclusion to their brief rely upon only five of the many patents referred to as showing that the patent in suit was anticipated and is therefore invalid for want of novelty and invention, viz: Everson (1886), Froment (Italy, 1902; Great Britain, 1903), Glagner (1903), Schwartz (applied for April 19, 1905, issued December 19, 1905), and Kirby (applied for October 17, 1903), issued December 18, 1906). And the defendant, a man obviously experienced in the subject, says that, in his opinion, the whole basis of flotation concentration was disclosed in the Everson United States patent No. 348157 and in the Froment British patent.

It is clear that in the prior art, as it is developed in this record, it was well known that oil and oily substances had a selective affinity or attraction for, and would unite mechanically with, the minute particles of metal and metallic compounds found in crushed or powdered ores, but would not so unite with the quartz, or rocky non-metallic material, called "gangue." Haynes British patent (1860), and United States patents, Everson (1885), Robson (1897) and Elmore (1901). It was also well known that this selective property of oils and oily substances was increased when applied to some ores by the addition of a small amount of acid to the ore and water used in process of concentration. United States patents, Everson (1885), Elmore (1901), and Cattermole (1904).

Prior to the date of the patent in suit a number of patents had been granted in this and other countries for processes aiming to make practical use of this property of oil and of oil mixed with acid in the treatment of ores, all of which, speaking broadly, consisted in mixing finely crushed or powdered ore with water and oil, sometimes with acid added, and then in variously treating the mass—"the pulp"—thus formed so as to separate the oil, when it became impregnated or loaded with the metal and metal-bearing particles, from the valueless gangue. From the resulting concentrate the metals were recovered in various ways.

The processes, of this general character, described in the prior patents may be roughly divided into two classes. The process in the patents of the first class is called in the record the "Surface Flotation Process" and it depends for its usefulness on the oil used being sufficient to collect and hold in mechanical suspension the small particles of metal and metalliferous compounds and by its buoyancy to carry them to the surface of the mixture of ore, water and oil, thus making it possible, by methods familiar to persons skilled in the art, to float off the concentrate thus obtained into any desired receptacle. The waste material, or gangue, not being affected by the oil and being heavier than water sinks to the bottom of the containing vessel and may be disposed of as desired.

The process of the other class, called in the record the "Metal Sinking Process," reverses the action of the surface flotation process and is illustrated by the Cattermole United States patent, No. 777273, in which oil is used to the extent of 4 to 6 to 10 per cent of the weight of the metalliferous mineral matter, depending on the character of the ore, for the purpose of agglomerating the oil-coated concentrate into granules heavier than water, so that they will sink to the bottom of the containing vessel, permitting the gangue to be carried away by an upward flowing stream of water.

The process of the patent in suit, as described and practiced, consists in the use of an amount of oil which is "critical," and minute as compared with the amount used in prior processes "amounting to a fraction of 1 per cent on the ore," and in so impregnating with air the mass of ore and water used, by agitation—"by beating the air into the mass"—as to cause to rise to the surface of the mass, or pulp, a froth, peculiarly coherent and persistent in character, which is composed of air bubbles with only a trace of oil in them, which carry in mechanical suspension a very high percentage of the metal and metalliferous particles of ore which were contained in the mass of crushed ore subjected to treatment. This froth can be removed and the metal recovered by processes with which the patent is not concerned.

It is obvious that the process of the patent in suit, as we have described it, is not of the metal sinking class, and while it may, in terms, be described as a surface flotation process, yet it differs so essentially from all prior processes in its character, in its simplicity of operation and in the resulting concentrate, that we are persuaded that it constitutes a new and patentable discovery.

The prior processes which we have described required the use of so much oil that they were too expensive to be used on lean ores, to which they were intended to have their chief application, and the efforts of investigators for several years prior to the discovery of the process in suit had been directed to the search for a means or method of reducing the amount of oil used, and it is clear from the record that approach was being made, slowly, but more and more nearly to the result which was reached by the patentees of the process in suit in March, 1905. The Froment Great Britain patent (1903) and the Kirby United States patent (applied for in 1903 and granted in 1906) are especially suggestive of the advance which was being made toward the desired result, but the Froment process was little more than a laboratory experiment and has never proved of value in practice, and the Kirby process, though approaching in some respects more nearly to the end attained by the process of the patent in suit, found its preferred application in the use of an amount of oil solution equal to one-fourth to three-fourths in weight of the ore treated, which was prohibitive in cost.

Into this field of investigation at this stage of its development came the patentees of the patent in suit. They were experienced metallurgists of London, of inventive genius and with financial resources, and they entered upon an investigation of the processes of oil concentration of ores which was continued through several years, and consisted of a very extended series of experiments in which the quantities of oil, of water and of acid used and the extent and character of the agitation of the mass under treatment resorted to, were varied to an almost unparalleled extent as to each factor and the results were carefully tabulated and interpreted. It was while pursuing a comprehensive investigation of this character, having, as the evidence shows, the special purpose in mind at the time to trace the effect on the results of the process of a reduction to the vanishing point of the quantity of oil used, that the discovery embodied in the patent in suit was made. The experimenters were working on the Cattermole "Metal Sinking Process" as a basis when it was discovered that the granulation on which the process depended practically ceased when the oleic acid (oil) was reduced to about 5 per cent "on the ore." It was observed, however, that, as the amount of oleic acid was further reduced and the granulation diminished, there was an increase in the amount of "float froth," which collected on the surface of the mass and that the production of this froth reached its maximum when about 1 per cent or slightly less "on the ore" of oleic acid was used. This froth, on collection, was found to consist of air bubbles modified by the presence of the minute amount of oil used and holding in mechanical suspension between 70 and 80 per cent of the total mineral content of the mass treated. It was promptly recognized by the patentees that this froth was not due to the liberation of gas in the mass treated by the action of the dilute acid used, and its formation was at once attributed in large part to the presence of the air introduced into the mixture by the agitation which had been resorted to to mix the oil with the particles of crushed ore, which air, in bubbles, attached itself to the mineral particles, slightly coated as they were with what was necessarily an infinitesimal amount of oil and floated them to the surface. The extent of the agitation of the mass had been increased as the experiments proceeded until the "series of Gabbett mixers, fitted with the usual baffles, were speeded at from 1,000 to 1,100 revolutions per minute."

A careful consideration of the record in this case convinces us that the facts with respect to the process of the patent in suit are not overstated by the plaintiffs' witness, Adolph Liebmann, an expert of learning and experience, when he says in substance:

"The present invention differs essentially from all previous results. It is true that oil is one of the substances used but it is used in quantities much smaller than was ever heard of, and it produces a result never obtained, before. The minerals are obtained in a froth of a peculiar character, consisting of air bubbles which in their covering film have the minerals embedded in such manner that they form a complete surface all over the bubbles. A remarkable fact with regard to this froth is that, although the very light and easily destructible air bubbles are covered with a heavy mineral, yet the froth is stable and utterly different from any froth known before, being so permanent in character that I have personally seen it stand for twenty-four hours without any change having taken place. The simplicity of the operation, as compared with the prior attempts, is startling. All that has to be done is to add a minute quantity of oil to the pulp to which acid may or may not be added, agitate for from two and one-half to ten minutes and then after a few seconds collect from the surface the froth which will contain a large percentage of the minerals present in the ore."

It is not necessary for us to go into a detailed examination of the process in suit to distinguish it from the processes of the patents relied on as anticipations, convinced as we are that the small amount of oil used makes it impossible that the lifting force which separates the metallic particles of the pulp from the other substances of it is not to be found principally in the buoyancy of the oil used, as was the case in prior processes, but that this force is to be found, chiefly, in the buoyancy of the air bubbles introduced into the mixture by an agitation greater than and different from that which had been resorted to before and that this advance on the prior art and the resulting froth concentrate so different from the product of other processes make of it a patentable discovery as new and original as it has proved useful and economical. It results without more discussion, that we fully agree with the decision of the House of Lords, arrived at upon a different record and with different witnesses, but when dealing with the equivalent of the patent in suit, in Minerals Separations, Ltd., *vs.* British Air Concentration Syndicate, Ltd., 27 R. P. C. 33. In this decision Lord Shaw, speaking for the court and distinguishing the process there in suit especially from the Elmore oil flotation process which had gone before but which was typical of the then prior art said: "They (the patentees of the agitation froth process of the patent in suit) are not promoting a method of separation which had before been described, but they are engaged upon a new method of separation. Instead of relying upon the lesser specific gravity of oil in bulk they rely upon the production of a froth by means of an agitation which not only assists the process of the minute quantities of oil reaching the minute particles of metal, but forms a multitude of air cells, the buoyancy of which air cells, forming around single particles of the metal, floats them to the surface of the liquid."

And Lord Atkinson said: "In their process this mysterious affinity of oil for the metallic particles of the ore is availed of, yet the oil is used in such relatively infinitesimal quantities, that the metallic particles are only coated with a thin film of it, and the lifting force is found not in the natural buoyancy of the mass of added oil, but in the buoyancy of air bubbles, which, introduced into the mixture by the more or less violent agitation of it, envelop or become attached to, the thinly oiled metallic particles, and raise them to the surface, where they are maintained by what is styled the surface tension of the water."

The record shows not only that the process in suit was promptly considered by the patentees as an original and important discovery, but that it was immediately generally accepted as so great an advance over any process known before that, without puffing or other business exploitation, it promptly came into extensive use for the concentration of ores in most, if not all, of the principal mining countries of the world, notably in the United States, Australia, Sweden, Chile and Cuba, and that, because of its economy and simplicity, it has largely replaced all earlier processes. This, of itself, is persuasive evidence of that invention which it is the purpose of the patent laws to reward and protect. Diamond Rubber Co. *vs.* Consolidated Tire Co., 220 U. S. 428; Carnegie Steel Co. *vs.* Cambria Iron Co.,

185 U. S. 403, 429, 430; The Barbed Wire Patent, 143 U. S. 275; Smith *vs.* Goodyear Dental Vulcanite Co., 93 U. S. 486.

The claim that the patentees of the patent in suit are not the original discoverers of the process patented because an employe of theirs happened to make the analyses and observations which results immediately in the discovery, cannot be allowed. The record shows very clearly that the patentees planned the experiments in progress when the discovery was made; that they directed the investigations day by day, conducting them in large part personally and that they interpreted the results. Agawam Company *vs.* Jordan, 7 Wall. 583-603, rules this claim against the defendant.

Equally untenable is the claim that the patent is invalid for the reason that the evidence shows that when different ores are treated preliminary tests must be made to determine the amount of oil and the extent of agitation necessary in order to obtain the best results. Such variation of treatment must be within the scope of the claims, and the certainty which the law requires in patents is not greater than is reasonable, having regard to their subject matter. The composition of ores varies infinitely, each one presenting its special problem, and it is obviously impossible to specify in a patent the precise treatment which would be most successful and economical in each case. The process is one for dealing with a large class of substances and the range of treatment within the terms of the claims, while leaving something to the skill of persons applying the invention, is clearly sufficiently definite to guide those skilled in the art to its successful application, as the evidence abundantly shows. This satisfies the law. Mowry *vs.* Whitney, 14 Wall. 620; Ives *vs.* Hamilton, 92 U. S. 426, and Carnegie Steel Co. *vs.* Cambria Iron Co., 185 U. S. 403, 436, 437.

The evidence of infringement is clear.

While we thus find in favor of the validity of the patent, we cannot agree with the District Court in regarding it valid as to all of the claims in suit. As we have pointed out in this opinion there were many investigators at work in this field to which the process in suit relates when the patentees came into it, and it was while engaged in study of prior kindred processes that their discovery was made. While the evidence in the case makes it clear that they discovered the final step which converted experiment into solution, "turned failure into success," (The Barbed Wire Patent, 143 U. S. 275), yet the investigations preceding were so informing that this final step was not a long one and the patent must be confined to the results obtained by the use of oil within the proportions often described in the testimony and in the claims of the patent as "critical proportions" "amounting to a fraction of 1 per cent on the ore," and therefore the decree of this court will be that the patent is valid as to claims No. 1, 2, 3, 5, 6, 7 and 12, and that the defendant infringed these claims, but that it is invalid as to claims 9, 10 and 11. Claims No. 4, 8 and 13 were not considered in the decrees of the two lower courts and are not in issue in this proceeding.

The decision of the Circuit Court of Appeals will be reversed, and the decision of the District Court, modified to conform to the conclusions expressed in this opinion, will be affirmed.

The claims of the patent are as follows:

The Supreme Court, in its decision, upheld claims Nos. 1, 2, 3, 5, 6, 7 and 12. Claim No. 1 consists in:

(*a*) Mixing the powered ore with water.

(*b*) Adding a small portion of an oily liquid having a preferential affinity for metalliferous matter (amounting to a fraction of 1 per cent on the ore).

(*d*) Separating the froth from the remainder by flotation.

Claim No. 2 consists in:

(*a*) Mixing the powdered ore with slightly acidified water.

(*b*) Adding a small portion of an oily liquid having a preferential affinity for metalliferous matter (amounting to a fraction of 1 per cent on the ore).

(*c*) Agitating the mixture until the oil-coated mineral matter forms into a froth.

(*d*) Separating the froth from the remainder by flotation.

Claim No. 3 consists in:

(*a*) Mixing the powdered ore with slightly acidified water.

(*b*) Adding a small proportion of an oily liquid having a preferential affinity for metalliferous matter (amounting to a fraction of 1 per cent on the ore).

(*c*) Warming the mixture.

(*d*) Agitating the mixture until the oil-coated mineral matter forms into a froth.

(*e*) Separating the froth from the remainder by flotation.

Claim No. 5 consists in:

(*a*) Mixing the powdered ore with water.

(*b*) Adding a small proportion of oleic acid amounting to 0.02–0.5 per cent on the ore.

(*c*) Agitating the mixture until the oleic acid has been brought into efficient contact with the mineral and has formed a froth therewith.

(*d*) Separating the froth from the remainder by flotation.

Claim No. 6 consists in:

(*a*) Mixing the powdered ore with water containing a fraction of 1 per cent of sulphuric acid.

(*b*) Adding a small proportion of oleic acid amounting to 0.02–0.5 per cent on the ore.

(*c*) Agitating the mixture until the oleic acid has been brought into efficient contact with the mineral and has formed a froth therewith.

(*d*) Separating the froth from the remainder by flotation.

Claim No. 7 consists in:

(*a*) Mixing the powdered ore with water containing a fraction of 1 per cent of sulphuric acid.

(*b*) Adding a small proportion of oleic acid amounting to 0.02–0.5 per cent on the ore.

(*c*) Warming the mixture to 30 and 40° C.

(*d*) Agitating the mixture until the oleic acid has been brought into efficient contact with the mineral and has formed a froth therewith.

(*e*) Separating the froth from the remainder by flotation.

Claim No. 12 consists in:

(*a*) Coating the minerals with oil in water containing a fraction of 1 per cent of oil on the ore.

(*b*) Agitating the mixture to cause the oil-coated mineral to form a froth.

(*c*) Separating the froth from the remainder of the mixture.

In claims Nos. 2, 3 and 12, it will be noted that the amount of oily liquid is specified as a fraction of 1 per cent. In claims Nos. 5, 6 and 7, the amount of oleic acid is specified as being 0.02–0.5 per cent.

Claims Nos. 9, 10 and 11, were found invalid by the Supreme Court. Claim No. 9 provides for the separation of the mineral from the gangue by:

(*a*) Coating the mineral with water containing a small quantity of oil.

(*b*) Agitating the mixture to form a froth.

(*c*) Separating the froth.

In No. 10, the separation is provided for by:

(*a*) Coating the mineral with oil in water containing a small quantity of oil.

(*b*) Warming the mixture.

(*c*) Agitating the mixture to form a froth.

(*d*) Separating the froth.

In claim No. 11, separation is provided for by:

(*a*) Coating the mineral with oil in water containing a small quantity of oil, and a quantity of acid sufficient to cause chemical action on the metalliferous minerals present.
(*b*) Agitating the mixture to form a froth.
(*c*) Separating the froth.

PREPARATION OF NEW REVISION OF LAWS BILL TO BEGIN SOON

It is the hope of Dr. Martin D. Foster, Chairman of the House Committee on Mines and Mining, that a revision of the mining laws may be secured without the delay and expense which would be occasioned by sending out an inquisitorial commission. Dr. Foster states that he is not wedded to the bill which bears his name and which is now before his committee. This bill simply was submitted, he says, to form a basis on which to work and to bring out expressions of opinion from the mining men of the country.

Many experienced mining men see very little good in the Foster bill. It is condemned unqualifiedly by many engineers. It seems to be a very general opinion, judging from correspondence being received in Washington, that it is worse than the existing statutes applying to mining.

Dr. Foster is very well pleased with the amount of comment that has been incited by this bill. He apparently has no objection to retiring it entirely, providing something better can be submitted. He is anxious that all ideas as to what is proper for the compilation of a new bill be submitted to his committee.

Steps looking to a constructive suggestion to the committee are being taken by prominent mining men and it is expected that a new bill will be formulated as soon as possible. It is hardly within the range of possibility that such a bill can be presented at this session.

LONG CONTINUANCE OF ZINC MINING IN MISSOURI ASSURED

The immense ore bodies in the southeastern Missouri district insure long continuance of operations, and as a result the concentrating equipment is most modern and complete. All the milling plants are large, most of them are comparatively new, and each has recently been equipped with a flotation section. The Federal Lead Co. will soon complete a 2,500-ton mill at Flat River.—(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

Says Mining Congress Can Help

"No more important work faces the American Mining Congress, and the mineral interests generally, than that of impressing upon the people of the United States the tremendous value of the mining industry to the welfare of the country." (Extract from address of C. A) Tupper, at the Mining Congress Convention.

LACK OF WATER STOPS MINES IN MISSOURI ZINC DISTRICT

The value of ore mined in the Missorui-Kansas-Oklahoma district during ten months of 1916, has surpassed the entire production of 1915 by a considerable amount, although less ore has been produced in this time, according to a report from the Kansas City Bank to the Federal Reserve Board. Ore prices have been higher and steadier during the present year. Considerable trouble has been experienced by lack of water, and several shutdowns resulted.

Drainage of the greater part of the productive area of the Leadville (Colo.) district is the one great factor holding promise of increased future activity in this field, the larger part of this territory having been fairly thoroughly developed above water level.

The October output of the Cripple Creek district showed a slight increase in volume, but a lower value. Renewed activity is reported in Colorado's tungsten district, large orders being reported at increased prices. It is claimed that there is very little of this mental stored in the mining camps. The State coal inspector of Colorado has issued a statement, showing that the production of coal in Colorado during the first nine months of 1916 increased 18 per cent over a similar period last year.

The development of the Mid-Continent oil field has settled down to a steadier and more satisfactory condition than a few months ago, when high prices ruled and promiscuous drilling was common. Operators generally predict a gradually increasing market in the field. October showed a good average month's drilling, with a satisfactory volume of new production, and a lessening of the tension caused by the detrimental pipe-line runs of the past few months. Extreme cold weather early in the present month caught many drillers unprepared, and considerable work was necessarily suspended. The total oil production of Oklahoma for the year, based on the present supply, is estimated to be approximately 95,000,000 barrels. There appears to be no lessening of general activities in Wyoming and Kansas fields, where important wells continue to come in.

DR. ASHLEY TAKES CHAIR OF GEOLOGY AT VANDERBILT

Dr. George H. Ashley of the Geological Survey has accepted a call to the chair of Geology at Vanderbilt University, at Nashville, Tenn. He has not severed his connection with the Survey, as the place may be temporary. Dr. Ashley is filling the position made vacant by Prof. L. C. Glenn, who is engaged in private work.

Copies of the Supreme Court opinion in the Minerals Separation case may be secured from the American Mining Congress, Munsey Building, Washington, D. C. Price 10 cents per copy.

HALF A BILLION DOLLARS WORTH OF COPPER MINED IN U. S. IN 1916

Output for Last Twelve Months More Than Doubles the Enormous Production of 1915—Profits for the Year Exceed $300,000,000—Arizona Produces 675,000,000 Pounds

The production of copper in the United States in 1916 surpassed all previous records, according to the United States Geological Survey, Department of the Interior. Preliminary figures and estimates have been collected by B. S. Butler, who has received reports from all plants known to produce blister copper from domestic ores and refined copper. At an average price of about 27 cents a pound the output for 1916 has a value of $520,000,000, compared with $242,900,000 for the output for 1915, and with $189,790,000 in 1913.

The figures showing smelter production from domestic ores represent the actual production of most of the companies for 11 months and an estimate of the output for December. The figures of a few companies for November were not available, and these companies furnished estimates for the last two months of the year.

According to the statistics and estimates received, the output of blister and Lake copper from domestic ores was 1,928,000,000 pounds in 1916, against 1,388,000,000 pounds in 1915, and 1,224,000,000 pounds in 1913.

The output of refined copper (electrolytic, Lake, casting and pig) from primary sources, domestic and foreign, for 1916, is estimated at 2,311,000,000 pounds, compared with 1,634,000,000 pounds in 1915, and with 1,615,000,000 pounds in 1913.

The production of copper from the mines of the United States for 1916 was more than double that of 10 years ago and more than four times that of 20 years ago. The profit resulting from the domestic production was far greater in 1916 than in any previous year. It is probably safe to say that it exceeded $300,000,000.

FOREIGN TRADE

According to the Bureau of Foreign and Domestic Commerce, the imports of all forms of unmanufactured copper for the first 10 months of 1916 amounted to 397,594,000 pounds. This compares with an import of 265,677,000 pounds for the first 10 months of 1915. The imports for the 12 months of 1915 were 315,698,449 pounds.

The exports of pigs, ingots, bars, plates, sheets, rods, wire, etc., for the first 10 months of 1916, as determined by the Bureau of Foreign and Domestic Commerce, amounted to 655,472,000 pounds compared with an export for the first 10 months of 1915 of 529,286,000 pounds. The exports for the 12 months of 1915 were 681,917,000 pounds.

At the beginning of 1916 there was about 82,400,000 pounds of refined copper in stock in the United States. This quantity added to the refinery production gives a total available supply of about 2,393,000,000 pounds of refined copper. On subtracting from this amount the exports for the first 10 months and the estimated export for the last 2 months, it is apparent that the supply available for domestic consumption is materially greater than the 1,043,000 pounds of 1915, no account being taken of stocks held at the close of the year.

HIGHER PRICES IN 1916

The average price of copper for 1916 showed a marked increase over that of the preceding year, being slightly above 27 cents a pound, compared with 17.4 cents in 1915.

Much of the copper was sold several weeks or months in advance of delivery, and it is, therefore, probable that the actual average price received differs somewhat from the average of the daily quotations for immediate delivery. The general trend of the market would indicate that the actual price received may be below that indicated by the average of quotations.

RECORD BY STATES

Arizona made a record production. The total may reach 675,000,000 pounds as compared with 432,000,000 pounds in 1915. This exceeds the total output of the United States as late as 1902.

Montana, with more than 350,000,000 pounds, exceeded its previous record production of 314,900,000 pounds in 1912. This compares with about 268,000,000 pounds produced in 1915.

Michigan, in common with other important copper producing States, made a record production. The output for 1916 was about 269,000,000 pounds, as compared with about 238,900,000 pounds in 1915, the previous record production.

Utah may show an increase of 60,000,000 pounds over the previous record production of 175,000,000 pounds in 1915.

The output from Alaska estimated at over 120,000,000 pounds compares with 70,600,000 pounds for 1915.

The production from Nevada will nearly

reach 100,000,000 pounds, which compares with the previous largest production of 85,200,000 pounds in 1913, and with 67,700,000 pounds in 1915.

The production of New Mexico will probably reach 90,000,000 pounds as compared with 62,800,000 pounds for 1915.

California, with a production that may exceed 60,000,000 pounds, showed a large increase over the previous record production of over 53,000,000 pounds in 1909. In 1915 the production was 37,600,000 pounds.

Tennessee alone among the important copper-producing States failed to show a record output. The production was probably slightly below 15,000,000 pounds, as compared with over 18,000,000 pounds for 1915.

DRAFT OF WATER POWER BILL SUBMITTED BY SECRETARY

Secretary Lane has suggested to the President, as a solution of the many conflicting water-power bills, the following measure:

PROPOSED WATER-POWER ACT

Section 1. This Act shall be known as the Water-Power Act.

Section 2. The Secretary of War, the Secretary of the Interior, and the Secretary of Agriculture shall compose a Water Power Commission.

Section 3. This Commission shall have power to grant leases for the use of all public lands (including reservations) and navigable streams for the development of water power, under such terms and conditions as shall be by them prescribed by general requlations; no such lease to extend for longer than fifty years.

Mr. Lane says that the advantages of this bill would be:

1. The administration would be held responsible for whatever terms and conditions were made as to such leases.

2. These terms and conditions would be known and fixed before the lease was made.

3. The terms and conditions could be made so as to draw a distinction between the use of navigable waters and others.

4. Such a measure would eliminate all controversy in Congress over details.

5. By regulation everything could be accomplished that is sought to be accomplished by the Ferris, Myers, Adamson, or Shields bill

6. There would be no danger of the caprice of any single cabinet officer, or his prejudice or favor, controlling the conditions of the leasing.

PRODUCES 900 TONS ZINC CONCENTRATES MONTHLY

The output of the zinc mine at Edwards, N. Y., for 1915 was 5,618 tons of concentrates, containing 2,455 tons of recoverable zinc. The mine is at present producing at the rate of 900 tons of concentrates a month, and the output for 1916 will be about 5,000 tons of recoverable zinc.—(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

COMPETITION FAILS TO AID CONSUMER OF COAL

"Competition seems to have failed of late years to benefit the consumer of coal. In the bituminous fields the competition whenever present has been wasteful, and in the anthracite fields there has been practical absence of healthy competition; and whether too great or too little competition, the result is the same—to increase the actual cost of bituminous coal by saddling the industry and its product with the fixed charges on idle or semi-idle mines and to raise the price of anthracite coal by favoring the burdens of high resource costs." (Extract from the address of Geo. Otis Smith at the Mining Congress Convention.)

MISLEADING TERM "WOLFRAM" IS FALLING INTO DISUSE

"Wolfram" is the English term for both the metal tungsten and the mineral wolframite. It is an awkward term, says Frank L. Hess, of the U. S. Geological Survey, descending from the old Saxon miners. However, the English, like the Americans, are beginning to use both words, tungsten and wolframite, and thus make the objects distinguishable. Tungsten is a metal, as is gold, tin, copper, or iron. Wolframite is a mineral which contains tungsten, iron, manganese, and oyxgen, and is probably the most common ore mineral of tungsten.

BUREAU OF MINES STRENGTHENS A. M. C. CONVENTION PROGRAM

The Bureau of Mines is proud of the important part which it took in the Chicago convention of the American Mining Congress. Among those contributing to the program at the convention were the following members of the staff of the Bureau of Mines: Van H. Manning, Director; F. G. Cottrell, Chief Metallurgist; Dorsey Lyon, Metallurgist; W. A. Williams, Petroleum Technologist; A. H. Fay, Statistican; Hennen Jennings, Consulting Engineer; John Hays Hammond, Consulting Mining Engineer: R. B. Moore, Chemist; Dr. Walter F. Rittman, Consulting Chemist; Ralph Arnold, Consulting Petroleum Technologist; Dr. David T. Day, Consulting Chemist; J. W. Thompson, Law Examiner; J. W. Paul, Consulting Safety Engineer.

Kentucky Operators Meet

The December meeting of the Kentucky Mining Institute was held December 8 and 9, at Louisville, Ky. Very interesting sessions are reported. It was one of the most interesting and successful meetings ever held by the Institute.

Copies of the Supreme Court opinion in the Minerals Separation case may be secured from the American Mining Congress, Munsey Building, Washington, D. C. Price 10 cents per copy.

PRINCIPAL ACHIEVEMENTS OF BUREAU OF MINES DURING YEAR SUMMED UP

Director Manning, in Concise Statement, Shows Long List of Things Accomplished in the Interest of the Mining Industry—Over 8,000 Miners Trained in First-Aid Work

Van H. Manning, director of the Bureau of Mines, in his annual report, makes a concise summing up of the work of the year as follows:

More than 8,400 miners were trained in mine rescue and first aid. On June 30, 1916, the total number of miners trained by the bureau since its organization was 42,045.

Representatives of the bureau attended and investigated eighty-nine accidents throughout the United States. Seventy-five men were rescued through the efforts of volunteer miners, company officials, State mine inspectors, and company rescue crews.

Forty-seven mine rescue and first-aid contests were held under the auspices or with the assistance of the Bureau of Mines.

Considerable progress was made in improving breathing apparatus for use in rescue and exploration work after mine explosions and fires.

Different types of breathing apparatus were demonstrated before thousands of miners.

Safety measures introduced in the gaseous coal mines of Oklahoma, with the assistance of the Bureau, have resulted in greatly reducing the number of explosions in these mines.

The study of coal-mine explosions and methods of preventing and limiting them was continued, and important advances were made in the application of preventive methods.

Sanitation and health conditions in mining towns were investigated and much valuable information obtained.

An investigation of hookworm in California mines, made in cooperation with State officials, resulted in measures being adopted which it is believed will eventually eradicate the disease in that State.

Health conditions among miners in the Joplin district, Missouri, have been greatly improved, largely as a result of the work of Bureau representatives in that district, and the high death rate from consumption will be reduced.

A study of conditions in the Butte, Mont., region was begun, with the result that miners' consumption has been shown to be prevalent among miners in that district.

The problem of subsidence of surface ground over mine workings in Illinois was studied and similar work in the anthracite region of Pennsylvania was continued.

Mining engineers of the Bureau actively assisted in investigating safety conditions in California mines and in formulating the mining regulations tending to increase safety, subsequently adopted by that State.

The Bureau assisted the department in the division of the Alaskan coal fields into leasing units and in preparing the regulations governing the leasing of coal lands in Alaska.

Considerable progress was made in investigations of smelter-smoke problems and of methods of removing from smelter smoke the constituents injurious to vegetation and animal life.

The possibilities and limitations of the wet Thiogen process for reducing sulphur dioxide to elementary sulphur were demonstrated.

A comprehensive report on the reduction of barium sulphate, of importance to paint and other industries, was prepared.

Progress was made in studies of the absorption and concentration of sulphur dioxide from smelter smoke and the purification of crude sulphur and arsenic.

Considerable progress was made in the work on cyanidation and allied processes for the treatment of gold and silver ores.

Methods were developed for treating low-grade complex gold, lead, silver, and zinc ores that if commercially successful will render available millions of tons of ore that cannot now be treated profitably.

Encouraging results were obtained in the application of a process for extracting zinc from low-grade oxidized ores not amenable to present processes.

Methods of mining and milling lead and zinc ores in the Joplin district, Missouri, have been greatly improved and losses reduced as a result of the investigation conducted by engineers of the Bureau.

An extensive investigation of causes and prevention of accidents at blast furnaces was completed and two reports on the subject prepared.

Methods of increasing safety at iron and steel works were investigated.

Health conditions in steel mills were studied and methods of improvement recommended.

Much valuable information was obtained on the corrosion of hoisting and pumping equipment by acid waters in mines, and the resistive qualities of different metals and coverings.

An investigation of the fluidity of blast-furnace slag and its relation to the composition of the slag and the iron obtained was begun.

An improved apparatus for measuring the viscosity of substances at high temperatures was devised.

A report on gold dredging, containing detailed figures as to operating costs and other data hitherto most carefully guarded by dredge operators was prepared for printing as a bulletin of the Bureau.

Several grams of radium has been produced

in cooperation with the National Radium Institute and has been delivered to the Howard A. Kelly Hospital, Baltimore, and to the General Memorial Hospital in New York City, for use in the treatment of cancer. The cost of production was a little over one-third the present market price.

Investigations of sandstone and marble quarries were continued and a report on safety in quarrying and one on the technology of marble quarrying were published.

Methods were devised for concentrating valuable radium ores of Colorado and Utah, heretofore wasted. Nearly 2,000 tons of such ore has been concentrated in cooperation with the National Radium Institute

Investigations of the technology of molybdenum and its ores were completed and a bulletin, describing methods of occurrence, concentration, and use, was prepared for printing.

Secondary kaolins (china clays) in the coastal plains of South Carolina and Georgia, heretofore unavailable for white ware, have been made available for the highest quality of tile and china.

An investigation of manganese deposits in the United States and of methods of mining and recovering manganese was begun

Studies of the Bureau have shown that metal losses in melting brass and aluminum chips can be greatly reduced, and an electric furnace for melting brass was developed.

The practicability of substituting domestic clay for English china clay in the manufacture of white ware products was demonstrated.

The relative explosibility of coal dusts from various mines and the proportion of rock dust required to make the coal dust inert were determined.

The study of the origin and constitution of coal was continued.

The properties of mine gases were investigated and a descriptive chart for display at mines was prepared for printing.

A gas detector for quickly determining inflammable gases in mine air was perfected.

Hoisting equipment in coal mines, and ways and means of preventing accidents in shaft and slope hoisting were investigated.

Progress was made on an improved type of oxygen rescue apparatus being developed by the Bureau.

Various types of electric mine lamps have been greatly improved through recommendations made by the Bureau.

Two types of explosion-proof coal-cutting equipment were approved.

Rules setting a proper standard of safety for the installation and operation of electrical equipment in bituminous coal mines, prepared by the Bureau, have helped greatly to increase safety in mines using such equipment.

Tests of explosion-proof storage-battery locomotives for use in gaseous mines were begun.

Types of flame safety lamps were improved.

The specifications for purchase of fuel for Government use were simplified and methods of analysis and sampling have been greatly improved, resulting in an increased saving to the Government.

Several Government power plants were inspected, by request of the departments concerned, resulting in a considerable decrease in fuel costs through the adoption of measures recommended by the Bureau.

A report on methods of saving fuel in heating dwelling houses has been of great benefit to the plblic at large.

The studies of combustion of coal in boiler furnaces was continued and much valuable information obtained.

Tests to determine the relation of the fusibility of coal ash to clinker trouble were made.

The use of coke as a domestic fuel and the coking qualities of various domestic coals were investigated.

Investigation of the methods of operating gas-producers plants was continued.

Important information regarding the character of the oil shales in the West was obtained.

The practicability of the Rittman cracking process for making gasoline, benzene, and toulene from petroleum has been demonstrated, and several commercial plants are in operation or process of erection.

As a result of the Bureau's work showing the necessity of properly protecting oil, gas, and water-bearing formations in drilling wells, in order to prevent escape and dissipation of the oil, gas, and water into other sands, millions of dollars' worth of oil and natural gas will be saved that would otherwise have been lost.

The value and the methods of using mud-laden fluid in drilling and closing oil and gas wells were demonstrated.

An investigation of the use of compressed air and water for flushing oil sands to increase the percentage of recoverable oil was conducted.

A study of the reactions and products in cracking petroleum by the Rittman process was made.

The properties of the chief grades of gasoline marketed in the United States were determined.

Methods for the analytical distillation of petroleum were investigated.

A study of the production, transportation, and distribution of natural gas in the Kansas-Oklahoma fields was begun.

A study of the production of gasoline from natural gas was made, and the results will help to increase the utilization of natural gas for making gasoline.

Methods and devices for controlling fires at oil and gas wells were studied.

Valuable information was obtained on the prevention of losses in storing petroleum.

Maps showing the location of wells, storage tanks, and pipe lines of the producing oil and gas fields of the United States were prepared.

Name of Company Changed

The name of the W. R. Garton Company, of Chicago, was changed January 1, to Electrical Material Company. This company was organized in 1898. Ray P. Lee is president of the new company. The offices of the company are now at 618 West Jackson Boulevard.

PUBLIC NEED FOR APPLIED SCIENCE BECOMES MORE EVIDENT THAN EVER

George Otis Smith in Annual Report on Work of Geological Survey Points to Increasing Research Work—Bureau Enlarging Policy of Speeding Up Statistics

"The increased extent to which the large industrial corporations of the country now support their own departments of scientific research is a gratifying development of the times," says George Otis Smith, director of the Geological Survey in his annual report. "Science is regarded as a necessity rather than a luxury. And this coming of science into its own as a large factor in the industrial life of the Nation is necessarily followed by a certain reaction of business upon science. Never before, perhaps, has the demand been so keen for research that is no less than ever scientific in spirit and in method but that has a definite purpose and yields definite results. The idea of making science useful is not new, but the utility of science has become more universally the test of its value."

Continuing, Dr. Smith says:

"In the scientific work done under the Federal Government this demand for results is abundantly justified by the public need. If the strongest corporations are making large use of chemists, physicists, and geologists, the general public has similar need in its service for applied science.

"The business policy of organizing scientific investigation for effective work, however, is far from novel, for in 1878, in the report to Congress advocating the creation of the United States Geological Survey, the National Academy of Sciences described the ideal plan for a scientific bureau as that which would yield the 'best results at the least possible cost.' Since that day, moreover, economy in science has become a more pressing issue.

"At the centennial exercises of the United States Coast and Geodetic Survey, in April, 1916, the Director of the Geological Survey called attention to the gratifying fact that for nearly four decades the two Surveys had worked side by side in the cause of American science coordinately rather than competitively. The result has been economy instead of waste. With this record in mind the appeal was then made for the application to the business of two score Federal scientific bureaus of the same rules that the legislatures and courts now enforce for the control of corporations. Unrestrained competition in the public service is no less wasteful than unregulated competition in private business. The ideal of the best service at the lowest cost leads to the recognition of the idea of natural monopolies in the Government scientific service, for this recognition will insure the same real saving to society that has come with the recent growth of public-utility monopolies. It does not follow that because the scientific bureau offers a special service to the public without direct price the public official is any less vitally interested in actual costs.

If the scientific work of the Government is to be organized on the basis of specialization rather than of competition the correlative idea of adequate regulation must be adopted A large share of this duty of insuring a proper coordination of the public scientific work must be accepted directly by the bureau chiefs and their immediate advisers in the work of administration. Moreover, to this group of Government scientists the obligation is double—they are constrained as public servants to avoid wasteful use of public money and as scientists to conserve scientific effort by preventing duplication in research and in publication. Faith in the effectiveness of highly specialized science must carry with it the belief that some one bureau, by reason of its organization, personnel, and experience, can conduct scientific investigations of a certain kind better than any other bureau. This is practical logic of the type that is recognized in private business, for under the public regulation of natural monopoly the public-utility company that first enters the local field is recognized and even protected by the public-service commission as long as the service it renders is at all adequate. The attempt of an overzealous bureau chief to seek preferment for his bureau on other grounds is not in harmony with the public-service idea that the Federal scientific bureau is only an agency to get results that are of largest value to the public it serves.

HAVE VALUE AS NEWS.

"A leading trade journal in a recent editorial commented upon the United States Geological Survey's 'enviable reputation for accuracy and preciseness throughout all its different branches,' but added that in maintaining this accuracy the Survey had 'in the past shown a tendency to ignore the necessity for promptness in placing its vast store of statistical data before the public.' This editorial, which was headed 'Geological Survey speeding up on statistics,' was prompted by the innovation in publishing statistics of coal production referred to below.

"The obvious difficulty of giving to the public statistical data that are accurate and yet

not somewhat out of date has been met since 1910 by supplementing the complete detailed reports with the publication in the first week of January of preliminary estimates of mineral production for the year just ended. These new-year statements have now attained a degree of accuracy that not only meets the practical needs of most users of this information but also robs the later complete reports of their news value. Thus the Survey's estimate of the gold output of Alaska for 1915, published January 1, 1916, was less than 1.2 per cent in excess of the final figures made public about four months later, and Alaska's exceptionally large yield of copper was estimated within 3 per cent. For the last two years the preliminary estimates of the coal output of the United States were only four-tenths of 1 per cent and 2.6 per cent in error; for the more erratic petroleum industry the estimates of marketed output published January 1 have been one-half of 1 per cent and 5 per cent of the final figures; the preliminary estimates of cement were within three-tenths of 1 per cent and four-tenths of 1 per cent of the actual output. The Survey geologist who made an estimate of the output of iron ore for 1914, in a statement issued January 1, 1915, 'approximated' the final figures with an error of only 239 tons, and his preliminary figures for the output in 1915, published January 1, 1916, were within nine-tenths of 1 per cent of the complete final figures.

"It is, of course, through the collection of detailed statistics from individual producers that the specialist is able to keep so closely in touch with his subject that his preliminary estimates have high value for approximate accuracy. Some advances have been made in the date of publication of the final statistical reports, but here the compiler encounters the difficulty of obtaining full and prompt cooperation from a very small minority of the producers, so that it is the last 1 or 2 per cent of the returns that cost the most time and effort. A gain of weeks in the date of publication of the statistics of some products might be made, but only at a sacrifice in the quality of the results. The standard of accuracy maintained by the man of scientific training shows itself in his aversion to round figures. The Survey will continue to seek improvement in the promptness of issue of the final reports, but the public need for authoritative mineral statistics possessing full news value will be met by estimates published January 1 and at other times in the year. The Survey's new-year and mid-year statements have already won a place in the public press because they furnish the business interests with impartial estimates of the rate of production of the raw materials and fuels that are so essential to the Nation's industry and commerce.

"As information to be valuable must be timely, the Geological Survey regards the preparation and issue of its quarterly and monthly statements as representing the ideal plan for statistics of all the principal metals and mineral fuels. Already a further step in the same direction has been planned: commencing August 15, the Survey will issue every month a comparative statement of railroad movement of coal and coke for the preceding month. It is believed that these authoritative figures will furnish the public a valuable index of the general industrial conditions as well as of the current rate of utilization of the country's mineral reserves."

MINE WORKERS RECEIVING AS HIGH AS $13.50 DAILY

A report to the Federal Reserve Board from its San Francisco bank says:

"Alaska, in common with other mining regions, is enjoying the prosperity caused by the prevailing high prices of metals. This is due largely to the copper production of the Kennecott mines, also to the increased activity in production from the low grade deposits near Juneau.

"Mining throughout the district is steadily expanding. The output of copper is continually making new records with enormous profits, particularly in Arizona, Utah, and Nevada. Prices are higher than at any time since the Civil War, when they were quoted in depreciated currency as high as 55 cents per pound. Miners are reported as receiving as much as $13.50 per day."

BUREAU OF MINES WORKING HARD ON NITROGEN PROBLEM

In an effort to oxidize ammonia to nitric acid, the Bureau of Mines has entered into a cooperative agreement with the Semet-Salvay Company at Syracuse, N. Y. This company is conducting extensive experimentation in this matter.

The Bureau has been taking a prominent part in the Government's investigation of the fixation of nitrogen. In addition to studies made in its laboratories, Dr. Charles S. Parsons, the Chief of Division of Mining Technology, has just completed an inspection of a number of European nitrogen plants. It is expected that the method of obtaining nitrogen from sources other than Chilean saltpetre will be decided largely on the recommendations which will be made by Dr. Parsons.

EXTRAORDINARY DEMAND FOR LEAD AND ZINC WELL MET

The lead and zinc producing districts of the United States have responded well to the extraordinary demands made upon them since the beginning of the war. The lead content of ore mined rose from 500,000 tons in 1913 to 523,000 tons in 1914 and 562,000 tons in 1915. The recoverable zinc content of ores mined was 406,000 tons in 1913, 407,000 tons in 1914, and 606,000 tons in 1915.—(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

GOVERNMENT EXPERTS WELL KNOWN TO MINING MEN

FRANK L. HESS
Geologist

THREE BILLION DOLLARS IN MINERAL PRODUCTION

In 1880, when the output of the mines of the United States barely exceeded in value one-third of a billion dollars, the first Director of the United States Geological Survey made this prophecy: "The mineral industries of the United States will soon reach an annual money yield of a thousand million dollars of value." This mark was in fact attained in 1899.

Speaking before the American Mining Congress in November, 1907, another Director of the Geological Survey referred to the probability that that year would mark an epoch in the mineral industry by reason of the mineral output reaching two billion dollars in values, and later the complete statistics verified this statement. Now less than 10 years later the advance estimates submitted by the Geological Survey to the Secretary of the Interior indicate that the total value of mineral production in 1916 may reach the three billion dollar mark.

METALLURGICAL EXAMINATION SET FOR JANUARY 16

The United States Civil Service Commission has announced an open competitive examination for supervising mining engineer and metallurgist. From the register of eligibles resulting from this examination certification will be made to fill a vacancy in this position in the Bureau of Mines for service in the field, at a salary of $4,000 a year, and vacancies as they may occur in positions requiring similar qualifications.

The duties of this position will be to take charge of one of the mining experiment stations, to supervise investigations and to disseminate information with a view to improving conditions in the mining, quarrying, metallurgical, and other mineral industries in the district served by the station, especially with a view to preventing unnecessary waste of resources and otherwise contributing to the advancement of these industries.

Competitors will be rated on the following subjects, which will have the relative weights indicated:

Subjects	*Weights*
1. Education	30
2. Professional experience	50
3. Publications, reports, or thesis	20
Total	100

Graduation from a college or university of recognized standing in mining engineering or metallurgy, and at least five years of responsible experience in mining engineering, two years of which must have been along metallurgical lines, are prerequisites for consideration for this position.

Under the third subject the applicant must submit publications, reports, or a thesis. If a thesis is submitted it should deal with some phase of mining or metallurgy.

Applicants must not have reached their fiftieth birthday on the date of the examination.

VIRGINIA EXPECTED TO INCREASE ITS PRODUCTION OF ZINC

Considerable prospecting is being done in the zinc regions of Virginia, and there is a possibility of opening other productive mines in the limestones of the Great Valley region, but apparently the most promising field for increased zinc production is in the pyrite belt of Louisa and Spotsylvania counties. The pyrite mines have always contained a little lead and zinc ore, but only very small shipments have been made. The ore of the Allah Cooper and Holladay mines contains more lead and zinc, and the latter mine especially is being actively developed as a zinc mine. The vein has been opened by several shafts and drifts, which are reported by the company to have proved 50,000 tons of mixed sulphide ore of practically shipping grade. —(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

ARIZONA METAL MINES PRODUCE $203,000,000 IN YEAR JUST CLOSED

Copper Is Mainly Responsible for an Increase of 123 Per Cent in the Value of the Mineral Output of the State—Nearly 700,000,000 Pounds of Copper Mined in 1916.

The output of gold, silver, copper, lead, and zinc from mines in Arizona in 1916 had a record total value of nearly $203,000,000, compared with $90,806,349 for 1915, according to the estimate of Victor C. Heikes, of the United States Geological Survey, Department of the Interior. The notable output of copper and the high prices of metals both assisted in this increase of 123 per cent. There were record productions, also, of gold, silver, copper, lead, and zinc.

The production of gold from Arizona mines increased from $4,166,025 in 1915 to approximately $4,427,000 in 1916, an increase of over 6 per cent. The production of gold from copper ores in most counties was naturally greater than in 1915, but there was a marked decrease in the output of bullion from amalgamation and cyanide mills, particularly in Mohave and Maricopa counties. Several new gold mines were added to the list during the year, especially in the Oatman camp, Mohave County, but the production was not sufficient to offset the decline in the output of the older properties. A new 200-ton mill was being completed for the United Eastern property, and considerable ore was opened at the Big Jim and Gold Ore mines.

The production of silver from the mines increased from 5,649,020 ounces in 1915 to a record output of about 6,823,000 ounces in 1916. As the market price was much higher, the value increased from $2,864,053 to nearly $4,490,000, an increase of nearly 57 per cent in value. There was no great change in the production from the Commonwealth property, which is principally a silver producer, so the increase is to be credited largely to the remarkable output of copper ore.

The mine output of copper surpassed all records and estimates, as it increased from 459,972,295 pounds in 1915 to approximately 693,000,000 pounds in 1916. The value of the output, on account of the unusual market, increased from $80,495,152 to nearly $190,000,000. The increase of 135 per cent in the value of copper alone in Arizona was, therefore, more than the value of the total output of the State in the previous year. All the smelting plants of the State were worked at full capacity and made much greater shipments of copper bullion. The plant at Sasco, in Pima County, was again operated and made a large contribution. The Inspiration mine was milling nearly 500,000 tons in August and was producing 11,000,000 pounds of copper, an output that made it one of the largest producers in the State. The Ray Consolidated, Miami, United Verde, and United Verde Extension made great increases. The Swansea property, in Yuma County, made a larger output, and a large leaching plant was being constructed at Ajo, in Pima County.

The mine production of lead increased from 21,738,969 pounds in 1915 to a record production of over 26,000,000 pounds in 1916. The value of this output increased from $1,021,732 to $1,768,000, or 73 per cent. The Copper Queen and Shattuck-Arizona mines, in the Warren district, and the Tennessee mine, in Mohave County, continue to contribute the largest part of the lead output.

The production of zinc from the mines increased from 18,220,863 pounds, valued at $2,259,387, in 1915 to about 20,980,000 pounds, valued at $2,874,260, in 1916, an increase of nearly 27 per cent in value. The greater part of the zinc ore and concentrates was shipped from the Golconda and Tennessee properties, in Mohave County. There were, however, two new and important shippers of zinc ore—the Magma Copper Co. in Pinal County, which opened up zinc ore and constructed a concentrator late in the year, and the Duquesne property, in Santa Cruz County. Shipments were also made from the Kingman Zinc Co. near Kingman, the San Xavier mine, in Pima County, and the Gemmill-Randolph tailings at Crownking. Possibly 28,000 tons of crude zinc ore and concentrates were shipped from the State during the year.

Dividends paid to December 1 amounted to nearly $34,000,000. The contributors were the Copper Queen, Inspiration, Calumet & Arizona, United Verde, Ray Consolidated Miami, Shattuck-Arizona, United Globe, United Verde Extension, and Grand Gulch.

UNIFORM LAWS WILL INFLUENCE DIFFERENT STATES

"There is a certain amount of indifference on the part of operators, miners and legislators as to the enactment or enforcing of mining laws—a feeling that mining like agriculture or common commercial industries does not require special legislation. The satisfying feature of this situation is that the refusal of any such State to adopt a uniform law would not prevent other and leading States from enacting such a law. Furthermore, the adoption of a uniform law by any considerable number of States would be the last argument for the adoption of such a law by the States at present indifferent to any law." (Extract from address of J. W. Thompson at the Mining Congress Convention.)

GEO. S. RICE MAKES STUDY OF CROW'S NEST TROUBLE

Outbursts of gas and "bumps," which have threatened the very continuance of mining operations in the Crow's Nest coal fields of British Columbia, offer no insurmountable obstacles, in the opinion of George S. Rice, chief mining engineer of the Bureau of Mines, who just has returned from an examination of the district, on invitation of the Minister of Mines of the Dominion of Canada. Mr. Rice admits, however, that there are more adverse natural conditions in these mines than in any other with which he is familiar. Mr. Rice made exhaustive examination at a number of mines in company with Thomas Graham, the mine inspector for British Columbia and Provincial Mineralogist Roberston.

Not only is the coal which is mined in the Crow's Nest district of good grade, but it is an important source of supply for American railroads and smelters. In fact the Crow's Nest Pass Coal Co. is said to be a subsidiary company of the Great Northern Railroad. Apparently, British Columbia does not fear monopoly as the railroad was allowed to select over 200,000 acres of land in the most important coal field in British Columbia, thus insuring the opening up of the field. Incidentally the opening of this coal field has been of material advantage to smelters in the northwestern part of the United States, which are large consumers of the very excellent coke which is made from Crow's Nest coal. The Bureau of Mines has another reason for being anxious to learn as much as possible of the means of combating these phenomena in that similar occurrences are taking place in the Mount Ranier coal fields of Washington.

The term "bumps" is of English origin, Mr. Rice believes. The word is not in common use among miners in this country and has been interpreted by many to indicate a sudden "squeeze" or buckling of the floor or walls of mine passage ways. This is not the case, as the word is practically synonymous with "jar." It has its origin in the shocks accompanying earth movements.

In 1907 and 1908 a series of "bumps" occurred in the Crow's Nest district, accompanied by some outbursts of gas. This resulted in several fatalities and was the direct cause of the abandonment of work in the No. 2 mine. Mr. Rice believes that the great thickness of the covering material has much to do with the earth movements which are responsible for the "bumps." In the No. 2 seam the pressure on the unmined coal is no less than 2,000 pounds to the square inch.

Another bed of coal 150 feet higher up the mountain was opened following the prohibiting of further work in a part of the No. 2 seam. The immediate roof is soft and treacherous but above this there is a strong shale "main" roof. Work on this No. 1 seam was laid out systematically and with special care to prevent the disasters of the lower bed. Only 25 per cent of the coal was excavated. For some time after the opening of the No. 1 seam, there was complete immunity from "bumps," but from November 7 to November 13, 1916, a series of severe "bumps" occurred. Due to the fact that the first occurrence took place at night but few persons were endangered. Great falls occurred and the inner workings of the mine are still inaccessible.

A striking feature of the recent damage in the upper mine, Mr. Rice states, is that the "bumps" occurred in an area coinciding with that in which they took place in the lower workings.

Mr. Rice is not at liberty to announce his conclusions at this time. As soon as samples of gas and coal have been analyzed he will submit a report to the Minister of Mines.

BUREAU OF MINES TO CATCH UP ON METALLIFEROUS WORK

There are several problems connected with the iron industry that are in urgent need of intensive scientific investigation. Among them are:

1. Methods of mining.
2. Concentration of iron ores.
3. Problems of iron metallurgy.
4. Study of phosphorus, potash and other by-products.

The Bureau of Mines is planning work along these lines.

It was the idea of the late Dr. Holmes, the first director of the Bureau of Mines, to establish a large central mining experiment station, to be devoted to the metalliferous side of mining. The Pittsburgh station which is devoted largely to coal was founded with this idea in view. Later it developed that it would be easier to obtain appropriations for several stations, if they should be scattered throughout the mining States.

Since circumstances have prevented the Bureau of Mines from giving metaliferous mining the same attention as coal mining, every effort is being made, now that the Bureau is free to study the problems of metal mining, to make up for the time during which it was impossible to study this question.

Copper is to receive special attention at the Tucson station and is also being given attention in Salt Lake City and at other branches of the Bureau.

Zinc also is receiving attention at Urbana and will be the subject of research at Seattle.

It is anticipated that the Seattle station will be ready for the active pursuit of its work by February 1. Dorsey A. Lyon expects to reach Seattle, January 6. The building which will house the station at Seattle is undergoing repair so that February 1, is as early as it will be possible to begin the regular work, it is believed.

Work already is in progress at Tucson. Dr. Von Barnevelt, the superintendent, after starting some of the work has gone to Berkely and to Salt Lake City to arrange for the proper inter-relation of the work with those stations.

The Bureau officials here are just now in the throes of the civil service procedure necessary to secure the members of the staffs of the three stations.

COLORADO PRODUCES $49,000,000 IN MINERALS DURING LAST YEAR

Products of Mines Sell for More than Twice as Much Money as Was Received in 1915—Zinc Alone Shows Increase of Nearly $5,000,000 over Preceding Year

The mine output of gold, silver, copper. lead, and zinc in Colorado for eleven months of 1916 and the estimated output for December, according to data compiled by Charles W. Henderson, of the United States Geological Survey, Department of the Interior, indicates a yield for the year of $18,940,000 in gold, 7,620,000 ounces of silver, 70,200,000 pounds of lead (in terms of lead in lead bullion and lead in leaded-zinc oxide), 8,600,000 pounds of copper, and 130,000,000 pounds of zinc (in terms of spelter and zinc in zinc oxide), with a total value of nearly $49,000,000 compared with $22,414,944 in gold, 7,027,972 ounces of silver, 68,810,597 pounds of lead, 7,112,537 pounds of copper, and 104,594,994 pounds of zinc, with a total value of $43,426,697 in 1915. This shows a decrease of nearly $3,475,000 in gold, but increases of 592,000 ounces of silver, 1,390,000 pounds of lead, 1,487,000 pounds of copper, and 25,000,000 pounds of zinc. With the increased average value of metals, the values show increases of $1,451,000 for silver, $1,540,000 for lead, $1,103,000 for copper, and $4,840,000 for zinc.

The tonnage treated by the Globe, Leadville, Pueblo, Durango, and Salida smelters was approximately the same as in 1915, the ore coming from Canada, Colorado, Idaho, South Dakota, and other States, and including a greatly increased quantity of zinc residues from Kansas and Oklahoma zinc smelters. A flotation plant for the treatment of zinc-lead sulphide ores of the San Juan region was built and operated at the Durango smelter during the year. The copper matting plant at Ouray was idle. The United States Zinc Co.'s magnetic-wet concentration mill and smelter at Pubelo were actively operated on zinc-lead ores from Colorado and other western States. The western zinc oxide plant, at Leadville, was operated steadily. The Western Chemical Co.'s acid, magnetic separation, wet-concentration plant, at Denver, was operated steadily at increased capacity, as was the Empire Zinc Co.'s 200-ton magnetic separation plant, at Canon City, both treating chiefly Leadville zinc-lead sulphide ores. The old Rocky Mountain smelter, at Florence, was remodeled into a plant for the treatment of zinc-lead copper sulphide ores as an intermediate plant for the River Smelting and Refining Co.'s electrolytic smelter plant at Keokuk, Iowa, and large tonnages of sulphide ores were received from various Colorado counties. Copper ore, copper matte, and cyanide precipitates were shipped to the Omaha smelter, and some copper and lead ores were shipped to Utah plants.

The gold output of Cripple Creek (Teller County) was $11,800,000, a decrease of $1,883,000. Development continued at lower depths with the continued gradual lowering of the water level as the Roosevelt drainage tunnel was advanced toward the Vindicator-Golden Cycle properties. Experimentation with the flotation process was continued by the Vindicator Company and the Portland Company for the treatment of low-grade mine and dump ore.

Safety First.

Lock and test your safety lamp;
Examine well for fire damp;
Be sure your shots you do well tamp—
"Safety First."

Look out for electric juice,
And see the timbers are not loose,
And beware the mule's caboose—
"Safety First."

Never let your fancies roam;
Never be "nobody home;"
Keep a level-headed dome—
Safety First."

There are no angels watching you,
Good miners know that it is true
That God helps those who think and do—
"Safety First."

Don't indulge in any booze,
And keep the car wheels off your shoes,
And be liberal with the fuse—
"Safety First."

Be sure the treacherous roof you test;
Be careful where you sit to rest,
At rib or prop is always best—
"Safety First."

Always kick about the dust,
For it can be wet, and must,
Or some day the mine will "bust"—
"Safety First."

If there's gas it's up to you;
Don't light up and smoke a few,
Or the mine may light up too—
"Safety First."

Study up that first-aid fad,
If you don't you'll wish you had,
Some day you will need it bad—
"Safety First."

K. H. CHISHOLM.

Copies of the Supreme Court opinion in the Minerals Separation case may be secured from the American Mining Congress, Munsey Building, Washington, D.C. Price 10 cents per copy.

PRODUCTION OF MONTANA MINES APPROACHES $150,000,000 MARK

During 1916 the State's Mineral Output Increased 76 Per Cent over the Record-Breaking Figures of 1915—Copper Alone Sells for Nearly $100,000,000

The value of the output of gold, silver, copper, lead, and zinc from Montana mines in 1916 was over $145,000,000, which is greater than that of any past yearly output and an increase over the previous year of over $62,000,000. or nearly 76 per cent. There were notable increases as well as record outputs in the quantity of silver, copper, lead and zinc, but a decrease in gold output. These preliminary figures have been prepared by Victor C. Heikes, of the United States Geological Survey, Department of the Interior.

The mine output of gold was valued at $4,635,000, a decrease of nearly 14 per cent from $5,400,195 in 1915. Much gold came from the Scratch Gravel district and the Piegan-Gloster mine, in Lewis and Clark Counties, and from the Ruby Gulch and August, in Phillips County. The production of gold from ores milled was in several places less than in 1915, and even the gold output from siliceous ores smelted seems to be declining. The placer-gold output decreased, especially that from dredge operations, though sluicing was begun below Troy, in Lincoln County.

INCREASE IN SILVER PRODUCTION

The mine output of silver. in Montana increased from 14,378,437 ounces in 1915 to 16,686,000 ounces in 1916. The value, on account of better prices, increased from $7,289,868 to $10,979,000, or nearly 51 per cent. Most of this output came from ores and concentrates smelted, especially copper material, in which there was a great increase, but a considerable quantity also came from the lead and zinc concentrate mined at Butte, of which there was a larger production. Work was resumed at the Ophir mine by the Butte Detroit Copper and Zinc Co., and the mill was remodeled.

HEAVY COPPER INCREASE

The mine production of copper, which is Montana's greatest asset, increased from 267,231,014 pounds in 1915 to 357,000,000 pounds in 1916, an increase of nearly 90,000,000 pounds. The increase in value was proportionately more, owing to the unusually high price—from $46,765,427 to $97,461,000, an increase of over 108 per cent. Everything was done at both the Anaconda smelters and that of the East Butte Co. to take advantage of the strong demand for copper, and at the same time important changes were in progress to improve the output and the saving. The Anaconda Co. was producing an average of 27,000,000 pounds of copper monthly, the East Butte Co., 1,500,000 pounds, and the North Butte Co., over 2,000,000 pounds. The Bullwhacker property made large shipments of siliceous copper ore. Wages at Butte were increased on a sliding scale, making a record pay roll. The Anaconda mines were reported to be producing in May 15,000 tons a day. Other producers were the Tuolumne, Davis Daly, and Butte Alex Scott, which was sold to the Anaconda Co. The Butte and Duluth leaching plant was again operated toward the end of the year. In Mineral County the Amador mine was again productive and a concentrator added.

GOOD INCREASE IN LEAD

The mine output of lead increased from 13,756,356 pounds in 1915 to a new record of 16,933,000 pounds in 1916, a gain of over 3,000,000 pounds. The value of the output was nearly doubled, increasing from $646,549 to over $1,151,000 or 78 per cent. A great part of this output came from lead concentrates made from lead-zinc ore at Butte and from residues resulting from the smelting of zinc concentrates from the Butte district. Part of the lead output came from the Iron Mountain mine, in Mineral County, which was operated by the Federal Mining and Smelting Co., until August. A mill was constructed at the Banner & Bangle property, near Troy, to treat lead-zinc ore.

TWENTY PER CENT INCREASE IN ZINC

The mine production of zinc increased from 187,146,895 pounds in 1915 to 227,000,000 pounds in 1916, an increase of nearly 40,000,000 pounds. In value the output increased from $23,206,215 to $31,099,000, or 34 per cent. The Butte and Superior Mining Co. was, as formerly, the greatest producer of zinc concentrates, shipping about 15,000 tons monthly for the first half of the year, according to the printed reports. The Elm Orly property, which is next in importance, also increased its zinc output, and large shipments were also from the Iron Mountain mine and from tailings concentrated at Basin. A considerable quantity of electrolytic zinc was made by the Anaconda Co., largely from ores mined at Butte. The construction of a large zinc electrolytic plant at Great Falls was progressing rapidly, and at the close of the year three units were complete. The plant is to have five units and will make an output of 6,000,000 pounds of zinc a month. A zinc concentration plant having a capacity of 2,000 tons was also constructed. About 233,000 tons of zinc concentrate and ore were shipped to eastern plants, aside from ore treated by the Anaconda Co.

The main dividend payers were the Ananconda Copper Co., and the Butte & Superior, but

smaller payments were made by the North Butte and Intermountain or Amador. The Barnes King and Kendall gold mines also paid dividends. The available figures show a total of dividends for the year of over $26,000,000, but these figures are not yet complete.

GEOLOGISTS INJURE PROFESSION BY TELLING ONLY PART OF TRUTH

That professional work on the part of geologists which involves testifying for a litigant in court is tending to lower the scientific standard of the profession, was declared by George Otis Smith, Director of the United States Geological Survey, in an address which was delivered before the Geological Society of America at its recent meeting in Albany, N. Y. Dr. Smith's conclusion is that it is a safety first measure to decline professional work of this type. He believes that the time is not distant when courts will summon their expert witnesses and compensate them for this service. This will mean, Dr. Smith declared, that the whole truth and not that part of the truth which favors one litigant, will be brought out.

The title of Dr. Smith's address is "Geology and Public Service." He made the appeal to American Geologists that they not only make their science more human, but that they humanize themselves. He stated his belief that the geologist is well qualified by special training not only to serve society in the capacity of a professional adviser but to take a larger part as a citizen.

HYDRAULIC FILLING MAY BE TRIED IN ILLINOIS MINES

Under the cooperative agreement of the Bureau of Mines with the State of Illinois, investigations into mine subsidence and roof supports have been made. The problem is of great and increasing importance in Illinois, because so much of the coal underlies rich agricultural land, where subsidence results in ponds and marshes. In many cases drainage is reversed or destroyed. Damage has been caused in towns built above the mines. The problem is complicated by the fact that the value of the surface land ranges up to $250 a acre, which is several times the value of the coal in places. The question of subsidence in Illinois is related to that of improved mining methods looking ultimately to the introduction of filling methods, such as hydraulic filling used so extensively in Germany.

Coal Report Delayed

Inability to secure the paper upon which maps are printed has resulted in a serious delay to the Geological Survey's coal report for 1915. Every effort has been made to secure this paper, but, owing to congestion at the mills, it was impossible to secure sufficient stock to go ahead with the report. By the time this reaches print the report will be available as follows:

Part A: Coal production.

Part B: Distribution and consumption.

MINING CONGRESS CHAPTER DEFEATS PROPOSED TAX AMENDMENT IN UTAH

By A. G. Mackenzie

Salt Lake City, December 12.—The proposed tax amendment of the Utah Constitution was defeated in November by the decisive vote of 55,079 to 14,958. Only seven of the twenty-eight counties of the State cast their votes in favor of the proposition.

One of the features of the proposed amendment was the taxation of net proceeds of mines at three times their value instead of their actual value as at present provided. Opposition to the amendment was led by the Utah Chapter, American Mining Congress, which conducted a vigorous educational campaign through newspapers and other channels.

HOMESTAKE MINE SHOWS AN INCREASE OVER LAST YEAR

The production of gold from mines in South Dakota in 1915 was $7,463,000, compared with $7,406,305 in 1915 and that of silver was 209,000 ounces, compared with 199,864 ounces in 1915. A nominal quantity of lead was produced. These are preliminary estimates reported by Charles W. Henderson, of the United States Geological Survey, Department of the Interior.

The Homestake mine and amalgamation-cyanidation mills were operated continuously throughout the year with an increased output. All the other cyanidation mills in Lawrence County were operated steadily, with the exception of the Bismarck. During a part of the year the Deadwood-Standard cyanidation mill was also operated on ore from the Slavonia property. A small production of placer gold was made in Custer, Lawrence, and Pennington Counties. A small yield of lode gold was made from the Hill City district, Pennington County, and considerable development was done in the Keystone district and several small shipments were made.

SHIPMENTS OF PORTLAND CEMENT BREAK RECORD

Shipments of Portland cement in the United States in 1916 approximated 94,508,000 barrels, an increase over 1915 of more than 750,000,000 barrels, the heaviest shipments in the history of the industry. Production, while it did not keep pace with shipments, reached a total of about 91,194,000 barrels, an increase of more than 5,000,000 barrels over 1915, while stocks fell off more than 3,000,000 barrels, according to estimates by Ernest F. Burchard of the United States Geological Survey, Department of the Interior. Prices averaged higher and trade conditions were generally better than in 1915, and the outlook for 1917 is reported as good.

UTAH MINES SHOW AN INCREASE OF 77 PER CENT DURING THE YEAR

In Twelve Months of Notable Production the Mines of the State Produce Close to $100,000,000 of Mineral Wealth—Steam Shovels at Bingham Produce Nearly 13,000,000 Tons of Ore

Utah mines will close the year 1916 with a record-breaking ore output of gold, silver, copper, lead, and zinc having a total value of about $97,000,000, as estimated by Victor C. Heikes, of the United States Geological Survey, Department of the Interior. This report indicates an increase of nearly 77 per cent, or $42,000,000 over the output of 1915. All the metals showed increases and there were record outputs of copper, lead, and zinc. About 14,000,000 tons of ore were mined in 1916, against 10,451,445 tons in 1915. The mines at Bingham produced the larger part of this ore, or nearly 13,000,000 tons, mostly by steam shovel mining. This quantity includes about 12,000,000 tons of porphyry copper ore, the output of which in 1915 amounted to 8,908,567 tons. In all districts many of the old mine and tailing dumps were reworked or shipped directly to the smelters. Ore shipments from the Tintic district totaled about 400,000 tons, representing an increase of 36 per cent over 1915. The estimate includes a quantity of oxidized iron ore greater than that shipped in any previous year, caused by the demand for flux at the different smelters. Several thousand tons of ore and old dump material that are not included in the estimate were milled in the district. In the Cottonwood and American Fork districts over 47,000 tons of ore of shipping grade was produced in 1916. Nearly half the output was hauled by wagon and tractor engines down Big Cottonwood Canyon to the valley furnaces. The Park City region produced less milling ore and more ore of shipping grade, which, with concentrates from three ore mills and two large tailing plants, amounted to nearly 90,000 tons, a decrease of about 7,500 tons from the output of 1915. In 1916 two new mills were erected at Frisco and Newhouse, in Beaver County, to work tailing yielding copper, lead, and zinc concentrates, which, with the ore shipped from the different mines, aggregated 65,000 tons. This is an increase of more than 46,000 tons over 1915. The ore output in Tooele County, principally at Ophir and the Stockton camps, including the smaller districts, North Tintic, Columbia, Dugway, and Erickson, amounted to 126,000 tons. This included the milling ore of the Ophir and Bullion Coalition properties. There was an increase of 14,000 tons of ore compared with 1915.

SOME INCREASE IN GOLD AND SILVER

The gold output of Utah shows a slight increase, from $3,609,109 in 1915 to $3,647,000 n 1916. Most of the increase is probably derived from copper ores, as the gold-producing districts were not very active. Bull Valley, Sheep Rock, Annie Laurie, and West Mercur mines each produced a little gold bullion. The placer gold production in the State is negligible.

The production of silver is 8 per cent greater, increasing from 12,313,205 ounces in 1915 to 13,357,000 ounces in 1916, amounting to an increase in value of over $2,500,000. Among the silver mines the Ontario was producing ore of shipping grade, and a large increase may be made from the Cottonwood districts. In the Tintic district, silver ores will benefit by the chloridizing-roasting process, which was put in successful operation, treating ore and old dump material from the Iron Blossom, Dragon, Swansea, and Black Jack mines. Precipitates containing high silver were produced and averaged a car a month before the increase of 100 to 300 tons in the roasting capacity of the plant.

SANTA FE GOES MORE THAN HALF WAY IN TRYING TO DISTRIBUTE FREIGHT CARS

Shippers in the West, in letters to Washington, are commending the unselfish action of the Atchison, Topeka and Santa Fe Railroad in its determined effort to return all empties as quickly as possible to home roads. Solid trains of empty cars were made up and hurried to connecting lines. An honest effort was made to comply with the request that cars be returned at the earliest possible moment. This plan resulted unfortunately for the Santa Fe, because connecting lines failed to exercise the same unselfish policy and, as a result, the Santa Fe was caught very short of cars and found it impossible almost to secure the return of its own equipment in anything like the time that they were returning the equipment of other lines.

Regardless of the fact that numerous shippers have suffered in consequence, the Santa Fe's system-wide effort is being commended very generally and has brought forth favorable comment from Government officials.

After a rehearing by the Interstate Commerce Commission, the Huerfano Coal Company has been sustained in its claim that the trackage contract between the Colorado and Southern and the Colorado and Southeastern Railroads causes an unlawful discrimination against the Coal Company in the matter of car supply.

NEW MEXICO INCREASES ITS MINERAL OUTPUT BY 74 PER CENT IN 1916

An Increase of Nearly 15,000,000 Pounds in the Amount of Copper Mined as Compared with 1915 is Registered—Year's Output from State's Mines Sells for $34,000,000

The output of New Mexico mines for eleven months of 1916, with an estimate for December, as reported by the United States Geological Survey, Department of the Interior, indicates a yield of $1,350,000 in gold, 1,800,000 ounces of silver, 7,100,000 pounds of lead, 91,400,000 pounds of copper, and 36,500,000 pounds of zinc (in terms of spelter and zinc in leaded-zinc oxide), valued in all at $33,469,400 as compared with $1,461,105 in gold, 2,005,531 ounces of silver, 4,542,361 pounds of lead, 76,788,366 pounds of copper, and 25,404,064 pounds of zinc, valued in all at $19,279,468 in 1915. These preliminary figures compiled by Charles W. Henderson show decreases of $111,105 in gold and of 205,531 ounces of silver; but increases of $167,596 in value of silver; 14,611,634 pounds in quantity and $11,514,236 in value of copper; 2,577,639 pounds in quantity and $269,309 in value of lead; and 11,095,936 pounds in quantity and $2,349,896 in value of zinc. The total value of the five metals increased $14,190,000, or nearly 74 per cent.

The Mogollon district, Socorro County (reached at present from the railroad at Silver City, Grant County (80 miles distant), continued to be the most productive district in New Mexico in output of gold and silver. There was a great deal of new development work in this district in 1916, but the yield decreased appreciably. The Socorro (Fanney) and the Mogollon (Ernestine) mines and mills were active. All the ore was milled in the district by concentration, sliming, and agitation and percolation in cyanide solution, the bulk of the product being cyanide precipitates, the balance being high-grade gold-silver concentrates. The Elizabethtown district, Colfax County, from the Aztec mine alone, was also a very large producer of metallic gold, gold bullion, and gold concentrates.

The Cossak cyanidation mill, in the Cochiti (Bland) district, Sandoval County, closed in December, 1915, was started up again in the spring of 1916 and contributed a considerable yield of silver-gold bullion. Gold bullion continued to be produced at the amalgamation mill on the North and South Homestake mines, at Whiteoaks, Lincoln County. The Lordsburg district, Grant County, which has been steadily increasing its shipments of siliceous gold and silver bearing copper and dry ores, again greatly increased its tonnage shipped. The copper concentrates of the Chino Copper Co., containing as they do small quantities of gold, contributed to the gold yield. The continued activity of the mines and matte smelter at San Pedro, Santa Fe County, also added an increased quantity of gold to the New Mexico yield. Shipments of copper ores from the Jarilla district, Otero County, carried some gold.

The principal metal produced in New Mexico is copper, and since 1910 the yield has been chiefly from the Chino Copper Co.'s low-grade copper deposits at Santa Rita. The ore is milled at Hurley in a large wet-concentration flotation plant. During 1916 the largest tonnage in the history of the company was treated and the gross output was 75,500,000 pounds. The Burro Mountain Copper Co.'s new concentrator began operations in April and started running at full capacity June 1, 1916. Much development work has been done at this property and the reserves are sufficient to supply the mill for years. The Santa Fe Gold & Copper Co.'s 125-ton matting plant, at San Pedro, added a considerable quantity of copper to the output. Copper ores were also shipped from the Organ Mountains district, Dona Ana County, where the Phelps-Dodge Co. has secured a large area which it has been developing during 1916. This district will produce all five metals. A large tonnage of low-grade copper ore with calcite gangue was shipped from the Apache mine, Hachita.

The yield of lead showed an appreciable increase. Lead ores were shipped from the Central, San Simon, and Pinos Altos districts, Grant County, and Cooks Peak and Victorio districts, Luna County. Considerable tonnages of lead carbonate ore were shipped from Kelly, Socorro County.

Increased shipments of zinc carbonate and sulphide ores and zinc sulphide were made in New Mexico in 1916. At Kelly, Socorro County, the principal producing mines were the Kelly, Graphic, and Juanita. The Ozark mill was operated continuously up to the time of the fire in August. The Kelly magnetic mill was operated from May throughout the year. At Hanover, zinc carbonate ores were shipped from the Hanover mines and others, and from June on, zinc sulphide concentrates were shipped from the Hanover magnetic separation mill. The Cleveland magnetic separation mill, at Pinos Altos, was operated steadily. A mill was erected in the revived Steeplerock district, Grant County, and some shipments were made. Zinc carbonate ores were shipped from the Magdalena, Hanover, Cooks Peak, Florida Mountains, Tres Hermanas, and Pinos Altos districts. Shipments of zinc ore and concentrates from New Mexico were 73,900 tons of 30.15 per cent grade, as compared with 41,852 tons of 36 per cent in 1915.

NAVY DEPARTMENT BALKS OIL LAND COMPROMISE

Efforts of the joint public lands committee to provide relief for the claimants of naval oil reserve lands in California were practically ended by the refusal of the Navy Department, through Secretary Daniels, to yield to compromise proposals.

Secretary Daniels in declining the proposals stated the Navy Department stood upon its strict legal rights and was opposed to any legislation for claimants to unpatented lands within the naval reserves.

The statement made by Navy Department officials that the bill would cripple the navy was denied emphatically by advocates of the proposed legislation. Records were produced showing the oil needs of the navy to be 1,000,000 barrels annually. An estimated increase for the next ten years would place the need at 12,000,000 barrels, with the necessity of a reserve of about 25,000,000 barrels.

The proposal made by the joint committee with respect to legislation for the relief of the California claimants would eliminate from the effect of the pending leasing bill, all railroad lands and other patented lands in the naval oil reserve and all claims in which any charges of fraud had been made.

It also would grant preferential leases only to claimants of unpatented lands, and who had initiated their rights prior to the first government withdrawal order in September, 1909, and who had prosecuted their claims in good faith to the discovery of oil, all royalties to go to the navy.

The other proposal, submitted by Commissioner Tolman, of the land office, would grant preferential leases to claimants of unpatented lands applying for patents in the same reserves, and who had in good faith prosecuted the work of the production of oil and were actually producing oil, upon the relinquishment of all other claims of title and upon payments to the government of back royalties upon oil heretofore extracted, all other royalties to go to the navy.

"The proposal of the committee," said Senator Pittman after the conference had failed, "was for the least possible remedial legislation for private claimants. The position of the Navy Department has been that to give this relief would cripple the navy. I do not think that it would. Assistant Secretary Roosevelt said the navy requirement at the present time was 1,000,000 barrels a year; that in ten or twelve years the requirement would be 12,000,000 barrels annually, and that there always should be about 25,000,000 barrels in reserve for war emergencies.

"In the three big naval oil reserves there are estimated to be 339,000,000 barrels of oil, and the government has shale land withdrawals in which there are reported to be 1,000,000,000 barrels of oil."

It is admitted that the people who took up the claims which are now in controversy acted in entire good faith. Not only did the President doubt his right to withdraw them, but the best possible legal advice indicated that he was without that right. It was held that persons who had taken claims before the withdrawal, and "with due diligence" prosecuted their development work, should receive patents. But the question of "due diligence" has proved a large and difficult one. The lands are in a region where water is only to be had at large expense, requiring establishment of facilities to pipe it in from long distances.

Some of the big concerns, backed by unlimited capital, were able to bring water promptly and continue development; others, with less means, were compelled to devote all energies to solving the water problem, and while they were bringing in water they could not do other work on the claims. Did they lapse from "due diligence" during the period when they were building water plants that were absolutely necessary to make development possible? They insist that they did not, and the equities of the matter seem to be impressing Congress, more and more, that they did not.

Chester Rowell, Republican national committeeman from California, who has been in Washington recently, and who has no possible interest in this controversy aside from a wish that justice should be done, emphatically declared that there was no division of opinion in his State about the justice of granting relief through legislation that would permit the claimants to proceed with their work. They have invested, in the aggregate, immense sums, ranging, it is said, into the millions, which are jeopardized and will be lost if relief is not granted.

The most insistent demand for some relief comes from men who understand the geological and technical problems of getting oil out of the earth. After an oil field is opened up, it is not possible to close it again without great loss of the oil. The danger in the present case is that the field will be ruined unless development is permitted to be continued, because many borings have been made.

IRON REGION LIKELY TO GET EXPERIMENT STATION NEXT

Speculation as to the work which will be undertaken by the three mining experiment stations which will be appropriated for at the present session of Congress is being indulged in. The chances apparently favor the location of one of these stations in an iron mining district. Thus far ferro-metallurgy has received only incidental attention from the Bureau of Mines. Another of the stations possibly may be devoted to a study of petroleum, while the third seems most likely to be devoted to the ceramic industries.

MINES OF ALASKA SHOW INCREASE OF 54 PER CENT DURING THE YEAR

Territory Which Cost the United States $7,000,000 Has Produced Since Its Purchase $351,000,000 in Mineral Wealth—Value of Copper Output in 1916 Double That of Gold

Minerals valued at $50,900,000 were taken from Alaskan mines in 1916. These are the advance figures issued by the United States Geological Survey, and are based on estimates made by Alfred H. Brooks. The output of Alaska mines in 1915, which was greater than that of any previous year, had a value of $32,850,000, and the increase in 1916 was therefore over 54 per cent. It was the product of the copper mines that so greatly swelled the mineral production of the year. This amounted to 120,850,00 pounds, valued at $32,400,000. There was also, however, an increase in gold output, which in 1916 was $17,050,000 and in 1915 was $16,700,000. Of the gold produced in 1916, $10,640,000 is to be credited to the placer mines. Alaska also produced in 1916 silver, lead, tin, antimony, tungsten, petroleum, marble, gypsum, and coal to the value of $1,300,000. During thirty-two years of mining Alaska has produced $351,000,000 in gold, silver, copper, and other minerals. Of this amount $278,000,000 represents the value of the gold, and $68,000,000 that of the copper. Although this enormous increase in output was in large measure due to the large tonnage and high price of copper, yet nearly all other minerals were produced in greater quantities than in the previous year. During thirty-two years of mining Alaska has produced over $351,000,000 worth of gold, silver, copper, and other minerals.

It cannot be expected that Alaska will continue to produce so much mineral wealth each year, yet the large amount of preparation made in 1916 for lode and placer mining and the development of the coal-mining industry, now assured, give promise of a continuous healthy growth of the mining industry of the Territory. This is especially true of the Pacific coast region and of the territory served by railroads built or under construction.

The Alaska mines are believed to have produced gold to the value of about $17,050,000 in 1916, compared with $16,700,000 in 1915. This makes the total value of the gold mined in the Territory about $277,900,000, of which some $196,800,000 has been won from the placers. In 1916 about 120,850,000 pounds of copper was produced in Alaska, valued at about $32,400,000. The production of 1915 was 86,500,000 pounds, valued at $15,100,000. The total copper production to date is 340,700,000 pounds, valued at $68,300,000.

The value of Alaska's lesser mineral products in 1916 was about as follows: Silver, $950,000; tin, $120,000; lead, $110,000; antimony, $60,000; tungsten, $50,000; coal, $30,000; petroleum, marble, gypsum, etc., $130,000.

GOLD PLACER MINING

The data in hand indicate that the value of the placer gold output in 1916 was $10,640,000; in 1915 it was $10,480,000. About 640 placer mines were operated in 1916, employing some 4,600 men. All the older districts appear to have held up or increased their output compared with the previous year, except Fairbanks. The increased output is however, to be credited chiefly to the new camps of Marshall and Tolovana. Thirty-six gold dredges were operated in Alaska in 1916, one more than in 1915—twenty-nine in Seward Peninsula, three in the Iditarod, and one each in the Ruby, Fairbanks, Circle, and Yentna districts. Of these thirty-six dredges, four were installed in 1916. It is estimated that these dredges produced between $2,000,000 and $2,200,000 worth of gold. If the final figures bear out this estimate, it indicates a lower recovery per dredge than in the previous year. In 1915 the thirty-five dredges mined $2,330,000 worth of gold.

GOLD-LODE MINING

About twenty-five gold-lode mines were operated in 1916, compared with twenty-eight in 1915. The value of this gold output increased from $6,069,000 in 1915 to about $6,200,000 in 1916. Southeastern Alaska, especially the Juneau district, is still the only center of large quartz-mining developments in the territory. Next in importance is the Willow Creek lode district. There was also considerable gold-lode mining on Price William Sound, but a very decided falling off of this industry in the Fairbanks district. Lode-mine owners of Fairbanks are awaiting the cheapening of operating costs, especially of fuel, which will be brought about by the Government railroad.

COPPER MINING

The enormous copper output from Alaska mines in 1916 has already been referred to. During the year eighteen copper mines were operated, compared with thirteen in1915—seven in the Ketchikan district, eight in the Prince William Sound district, and three in the Chitina district. The enormous output from the Kennicott mine, in the Chitina district, overshadowed all other operations. Had the transportation companies and smelters been able to handle the ore, however, many of the smaller copper mines would have made a much greater output. It is estimated that about 550,000 tons of copper ore was hoisted in 1916.

TIN MINING

About 232 tons of stream tin was produced in Alaska in 1916 Of this about 162 tons came from the York district, where two tin dredges were operated and a third was working on placer ground carrying both tin and gold. Developments were also continued on the Lost River lode-tin mine. The rest of the concentrates were recovered incidentally to placer-gold mining in the Hot Springs district of the lower Tanana basin.

ANTIMONY MINING

The mining of antimony ore (stibnite) began in Alaska in 1915 and continued in a small way through the first half of 1916. The fall in the price of antimony during midsummer put an end to most of these operations. About 1,460 tons of crude ore was mined and shipped during 1916. Much the larger part of this came from the Fairbanks district.

TUNGSTEN MINING

Though scheelite has long been known to occur in some of the Alaska placers, up to the last two years the demand for it has not been sufficient to encourage its recovery. The recent high price of tungsten has induced Alaska miners to turn their attention to scheelite deposits. In the fall of 1915 a scheelite-bearing vein was discovered in the Fairbanks district, and its development began. Later two other scheelite-bearing veins were found in the same district. During the winter some of these scheelite ores were treated in a local mill, and the concentrates were shipped out by parcel post. Scheelite mining was continued during the summer, and the crude ore was shipped out by steamer. Considerable scheelite was also recovered from some of the gold placers at Nome, and a little was produced in other districts. It is estimated that about 50 tons of scheelite concentrates were produced in Alaska during 1916, for which the producers received over $50,000.

MINERAL FUELS

The production of petroleum from the only oil claims patented in Alaska, in the Katalla district, continued in 1916. The operating company was reorganized and more extensive exploitation was undertaken.

About 8,000 tons of coal was mined in Alaska during 1916 from half a dozen small mines. The largest producer was the Bluff Point mine, on Cook Inlet, where a lignite bed was exploited for the local market. The mining of coal in the lower end of the Matanuska field, for the use of the Alaska Engineering Commission, was also a significant event. This part of the field is already made accessible by the Government railroad, now under construction. The construction of a private railroad from Bering River into the Bering River coal field was also begun, and a little coal was mined at the southwest end of the Bering River field. Tenders for leases of coal lands in both the Bering River and Matanuska coal fields under the new law have been received by the Interior Department. Another important event was the completion by the Geological Survey of a detailed examination of the more accessible part of the Nenana coal field, lying about 60 miles south of Fairbanks. All these facts indicate that systematic exploitation of the Alaska coal fields will soon be undertaken.

DENVER COMPANY TREATS LIGNITES SUCCESSFULLY

The treatment of lignite coal by the American Coal Refining Company at Denver has proven so successful that C. E. Lesher of the U. S. Geological Survey is of the opinion that it will have an important bearing on the development of the vast lignite fields of the United States. By extending the by-product principle of coke making to the lignite of northern Colorado, it has been possible to recover valuable tars and oils as well as a residue which is practically the equivalent of anthracite in composition. The larger sizes of this product are sold in direct competition with anthracite, while the dust and fine sizes are being briquetted.

One of the important products of this process is a flotation oil which is in great demand. This feature of the business alone Mr. Lesher regards as a very important one. The whole plan is characterized by Mr. Lesher as being real progress in conservation. After looking over the plant he pronounced it a mechanical success.

"I can see no reason," declares Mr. Lesher, "why this process should not be applicable to any of the deposits of black lignite in the West and possibly may be applied successfully to the brown lignites of North Dakota and eastern Montana."

COAL MINING INSTITUTE HAS SUCCESSFUL MEETING

The annual meeting and banquet of the Coal Mining Institute of America, held at Pittsburgh, recently, was more largely attended than previous meetings. Much encouragement was given the officers as to the success of its work.

W. L. Affelder was elected president; W. E. Fohl, first vice-president; Dr. W. E. Crane, second vice-president; F. W. Cunningham, third vice-president; H. D. Mason, secretary and treasurer.

Many interesting addresses were made. Among the speakers were Van H. Manning, director of the U. S. Bureau of Mines; S. C. Jones, of the du Pont Powder Company; L. B. Smith; James F. Callbreath, secretary of the American Mining Congress and J. T. Jennings, of the P. & R. Coal and Iron Co.

Copies of the Supreme Court opinion in the Minerals Separation case may be secured from the American Mining Congress, Munsey Building, Washington, D. C. Price 10 cents per copy.

JOPLIN AND MONTANA ZINC PROPERTIES INCREASE THEIR OUTPUTS DURING THE YEAR

The zinc-mining and zinc-smelting industries experienced a year of prosperity in 1916. According to the best information available at this time the recoverable zinc content of ore mined in the United States was about 708,000 tons, compared with 605,915 tons in 1915 and 406,959 tons in 1914. The largest district gain was made by the Joplin region, which had an increase of over 40,000 tons. Montana made a notable gain and from the returns available seems to have taken second place, but it will require complete figures to decide. Good gains were also made by the upper Mississippi Valley region, Colorado, Tennessee, Idaho, Nevada, New Mexico, New York, Arkansas, and Washington. The Eastern States produced 148,000 tons, or 21 per cent, the Central States 274,000 tons or 39 per cent, and the Western States 286,000 tons, or 40 per cent, of the total output of zinc in ore.

The following figures have been compiled without change by C. E. Siebenthal, of the United States Geological Survey, Department of the Interior, from reports furnishd by all operating smelters of zinc ores except one small plant, showing their output for the first 11 months of the year and their estimated output for December. The production of the smelter not reporting, which operated intermittently, has been estimated on the basis of its output for the first half of the year. Figures showing the imports and exports for 10 or 11 months were obtained from the Bureau of Foreign and Domestic Commerce, and to these figures have been added estimates for the remainder of the year.

INCREASE IN CAPACITY

There was much activity in the construction of retort zinc smelters during 1916, and considerable additions are under construction or planned for 1917. The number of retorts at the beginning of 1916 was 156,568, on July 1 it was 196,640, and at the end of the year it was 213,840, besides 13,648 additional retorts being built or planned. The Athletic Mining & Smelting Co. is building a smelter of 2,400 retorts at Fort Smith, Ark., to be completed in March, 1917. The United Zinc Smelting Corporation is building a smelter to have 6,912 retorts at Moundsville, W. Va., which will be completed early in the year. Additions are under way at Pueblo, Colo.; Peru and East St. Louis, Ill.; and Blackwell, Quinton, and Sand Springs, Okla. The Berger Manufacturing Co., of Canton, Ohio, completed plans for a smelter at Fort Smith, Ark., but the construction is yet in abeyance.

The full retort capacity was not utilized in smelting ore at any time during the year. A large number of retorts were occupied in redistilling prime western spelter. Many retorts were idle during parts of the third and fourth quarters of the year, but started up again late in the year, though a considerable number were still idle in December.

Two new smelters using large graphite retorts were built during 1916. These were the plants of the Eastern Zinc Refining Co. at Brooklyn, N. Y., with 8 large retorts and 16 more under construction or planned, and of the M. Mooshowitz & Son Metal Co. at Trenton, N. J., with 21 retorts. There are now five such plants, with 153 retorts.

Six electrolytic zinc plants were in operation in 1916. Four units of the large Anaconda plant at Great Falls, Mont., went into operation, and it is thought that the last unit will be completed about the first of 1917. The small Anaconda electrolytic plant at Anaconda, Mont., has been dismantled. The plant of the River Smelting & Refining Co. at Keokuk, Iowa, was active, and experiments were continued at the Bully Hill plant in California. The electrolytic zinc plant of the Judge Mining & Smelting Co., at Park City, Utah, and that of the Mammoth Copper Co., at Kennett, Cal., will be ready for operation by the middle of 1917. The Murray experimental plant of the American Smelting & Refining Co. is closed, and plans for a larger plant are abandoned for the present at least.

RECORD PRODUCTION

The production of spelter from domestic ore in 1916 is estimated at 553,000 short tons, worth, at the average St. Louis price, about $150,000,000, and from foreign ore at 105,000 tons, a total of 658,000 tons, worth $180,000,000, compared to a total of 489,519 tons in 1915 (458,135 tons of domestic origin, and 31,384 tons of foreign origin), worth $121,400,000 at the average St. Louis price. This was a gain of 169,000 tons in quantity and an indicated gain of more than $58,600,000 in value. The actual gain in value, however, was considerably less because much of the spelter was sold for future delivery at prices from 1 to 2 cents below the quotations for immediate delivery. Included in the output are 11,878 tons of electrolytic spelter, of which a part was refined by electrolysis from prime western spelter. The output of zinc dust was about 2,500 tons, compared with 1,755 tons in 1915.

The output of secondary spelter redistilled at regular smelters and at the smelters with large retorts was about 32,000 tons. It is probable that the output of remelted spelter was not less than that of the preceding year, 23,000 tons, which would give a total of 55,000 tons of secondary spelter. Adding this to the production of primary spelter gives a grand total of 713,000 tons of spelter made in the United States in 1916.

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CALIFORNIA MINES SHOW INCREASE OF 38 PER CENT

The mines of California made an output in gold, silver, copper, lead, and zinc valued in all at $44,384,000 in 1916 compared with $32,263,844 in 1915, according to preliminary figures compiled by Charles G. Yale, of the United States Geological Survey, Department of the Interior. This is an increase of $12,120,000, or 38 per cent.

The mine figures for gold in 1915 were $22,442,296. The estimates for 1916 indicate an output of $22,939,000 in gold, an increase of $497,000. The gold yield is the largest in 33 years. There are over 600 productive metal mines in the State, about evenly divided in number between deep and placer properties. From the deep mines the annual output of ore now exceeds 3,000,000 tons. In value of all metals produced, Shasta is the leading county; and in value of gold output Amador County.

The placer mines of the State continue to produce about 38 per cent of the annual gold yield. The gold dredges account for 35 per cent of the total gold yield, or 90 per cent of the placer gold yield. There are 59 dredges at work in the different fields, the most productive of which are in Yuba, Sacramento and Butte counties. One dredge recently launched has 18 cubic foot buckets and will handle 350,000 cubic yards monthly, digging to a depth below water level of 87 feet. In the Yuba River or Marysville field thus far in 1916 the yield of the gravel has been 12.87 cents to the cubic yard, at a working cost of 3.7 cents. Dredging is going on at the rate of 150,000,000 cubic yards a year. New machines have been installed in 1916 at several places in what are known as the outside districts, but these are generally of smaller capacity than those in use in the larger fields.

Renewed activity has been shown in all branches of metal mining in the State. All the older quartz mines are very active and a number of new ones have been opened. There is also an apparent tendency to renew drift-mining operations at several points.

The silver output from the mines in 1916 is estimated at 2,186,500 ounces, valued at $1,438,700, an increase compared with 1915, of 508,000 ounces in quantity, and of $588,000, or 69 per cent, in value. The silver is derived mainly from the smelting of copper, lead, and zinc ores, although some silver is recovered also in gold-mining operations.

The estimated mine yield of copper in 1916 is 62,630,000 pounds, valued at $17,097,990, compared with 40,751,625 pounds in 1915, an increase for 1916 of 21,878,000 pounds in quantity and of $9,966,000, or 140 per cent, in value. Shasta County was the largest producer, but considerable copper was also produced in Calaveras, Placer, and other counties. The high price of the metal has resulted in the opening of a number of new properties in the State.

The mine output of lead in 1915 was 4,579,245 pounds, valued at $215,225; the estimated yield for 1916 is 13,755,000 pounds, valued at $935,340, an increase in 1916 of 9,176,000 pounds, and of $720,000, or 335 per cent, in value. Most of the output comes from Inyo, San Bernardino, and other southern counties.

The estimated zinc output in 1916 is 14,400,000 pounds, valued at $1,972,800, which is an increase of 1,306,000 pounds in quantity and of $349,140, or 22 per cent, in value, compared with 1915. The zinc is all derived from Shasta and Inyo counties.

BAUXITE OPERATORS EXPECTED TO PROFIT BY ADVENT OF INDEPENDENT BUYERS OF ORE

Independent buyers have entered the field for bauxite. This means that those mining this mineral will have real competition in the purchase of their product for the first time. So far as can be ascertained the only market for bauxite, until recently, was with companies, all of which are allied. When aluminum was selling at 20 cents it was understood that a good profit was made by the refiners. Now that the price is as high as 65 cents, the margin of profit has increased, it is believed, as the price being paid for ores has not advanced in the same proportion as the price of sheet aluminum.

Gets Out New Catalogue

The Denver Quartz Mill and Crusher Company has just issued an attractive catalogue, showing the working of their crushing machinery. It carries a price list. The cut on the front cover shows the Cresson vug—the richest vug ever discovered.

FIELD BEING COVERED BY MINING CONGRESS JOURNAL IS OUTLINED

By Publishing in Detail the Great Work Being Done by the Government the Official Organ of the American Mining Congress is Providing a Service for its Members Which is not Furnished Elsewhere

Due to the fact that only a few of the members of the American Mining Congress could be present at the members' meeting which was held at the Chicago convention, an extract from the proceedings, which is about to follow, is given to inform the membership more generally of the efforts being made to serve the mining industry by issuing a monthly publication.

During the members' meeting the news editor of the JOURNAL was called upon to make some statement with reference to his work. The statement was not intended to be comprehensive but it brings out some of the features of the JOURNAL and at any rate it is a portion of the proceedings to which the attention of the membership is called.

The extract, which will be a part of the permanent record of the convention, is as follows:

Mr. Paul Wooton: There is great pleasure, Mr. President, in writing for such appreciative readers as are the members of the American Mining Congress. So many of you have gone to the trouble of sending us letters saying nice things about the JOURNAL that I want to take this opportunity of thanking you collectively. I want to thank Mr. Morrison, specifically, for his very kind tribute tonight. It makes our work worth while.

I am the News Editor of the JOURNAL. Mr. Callbreath looks after the writing of the editorials and I try to handle the news end. I am a newspaper man, having been in that business nearly all of my life. I am at present Washington Correspondent of the New Orleans Times Picayune, in addition to this work I am doing for the MINING CONGRESS JOURNAL. I pointed out to Mr. Callbreath, a year and a half ago, that the mining industry was one of the few industries not paying close attention to the news developing in Washington. He thought we could develop the JOURNAL so as to supply this need. We have gone ahead with that end in view. We are paying particular attention, as all those who read the JOURNAL know, to the vast amount of work the Government is doing in behalf of mining. The Government spends $60,000,000 a year in scientific and technical work. Of course, much of this expenditure has no direct bearing on mining, but a considerable portion of it is used for purposes having some bearing on mining. It seems to me that with such a large amount of money being spent in behalf of the miners, either directly or indirectly, this news ought to go promptly to those engaged in mining.

The JOURNAL is not a competitor of the technical mining papers. As most of them are really engineering papers, their greatest interest is in the engineering side of mining. They print some Washington news but it is in very condensed form and it is hardly adequate, it seems to me. The mining industry, until this JOURNAL was established, had less opportunity to read Washington news than did any other industry of importance. The lumber papers offer a good example. One lumber paper, with which I am familiar, prints eight pages of Washington news weekly. That compares with a very few paragraphs in the mining papers devoted to Washington news. But, as I say, the mining trade papers are largely devoted to engineering problems and technical news. Therefore, the JOURNAL hardly can be considered a competitor of other mining papers. The fact is they are mutually helpful.

I believe it has been the experience of newspapers generally that it takes a couple of years, or even more, to get them on a paying basis. With trade papers I think it takes longer. Of course, the JOURNAL carries no market quotations. The need for the JOURNAL, therefore, it is not so apparent as for publications carrying information for which there is a pressing demand. Therefore, the JOURNAL will be a little slower, I think, in reaching a profit-earning point than the average trade paper.

We have not had the support we should have had from some of the manufacturers of mining machinery, and other advertisers, it seems to me. At the same time I realize they have to be conservative in going into new publications. I believe as they come to understand that our paper is being read and as they learn that users of mining machinery are interested in the JOURNAL, more of them will use our columns.

If there is any question that anyone would like to ask about the JOURNAL I would be glad to answer it, if I can.

Mr. Morrison: I would like to ask what method of solicitation for advertising do you use? Here is a publication that goes to every coal operator directing mines. It ought to be the best medium for advertisers of any in the field.

Mr. Paul Wooton: I have no connection with the business management of the JOURNAL, but I know in a general way what is being done in regard to advertising. We feel that our circulation is among the very best customers the advertisers could wish for and we think that they will come to realize this. We have been a little unfortunate in advertising men. A good advertising man is hard to get. We have tried out a number of men. It resolved itself into trying to find the proper man. We have had to pick out the most likely applicants. In that way we have been put to considerable expense. Men would go out and would not get returns and their expenses, of course, would be lost without any return to us. However, we think we have been very fortunate recently in securing a Chicago company to look after the advertising, and I believe that the advertising from now on is going to meet nearly all the expenses of the publication. Mr. Callbreath can tell you something more about that.

Mr. Morrison: I suggest that you write me a letter and tell me what the rates are. I know three companies that are likely advertisers and I will undertake to get one of them.

Mr. Paul Wooton: That is very kind of you, sir.

Mr. Morrison: I believe you have the best medium for advertising there is in the field. That is my opinion of it.

Mr. Paul Wooton: I am glad to hear you say so.

Mr. Morrison: I am going to see these three people about it and let them know about it and I will leave it to you to write me to remind me of it and to give me some information.

Mr. Paul Wooton: I will certainly do that.

Mr. Morrison: I will get one of them anyway.

Mr. Paul Wooton: Under present conditions we are not justified in hiring anyone to help me gather the news, but as it is we get most of the mining news in Washington. We watch Congress very carefully. Anything of interest to the mining industry is certain to come to our attention. Through daily contact with members of Congress we usually learn in advance of any legislation that is being contemplated. Then we cover the Geological Survey and the Bureau of Mines in detail. Incidentally I lost one of my good news sources when Mr. Parker went to the Anthracite Information Bureau. Very little happens in the Geological Survey or the Bureau of Mines that is of interest to the mining industry that is not available for publication. Then there is the Land Office, which develops a good deal of news, the Board of Appeals of the Interior Department, the Patent Office and the Interstate Commerce Commission and other Bureaus.

At the Interstate Commerce Commission I am told that it is not understood why it is that the mining industry files so few complaints. The lumbermen have weeded out most of their rate inequalities. They have filed complaint after complaint until they have their rates very well adjusted. Since the mining industry has so very few complaints it is wondered whether it is due to the fact that

the miners are perfectly satisfied with their rates, meaning that there are no unjust discriminations against the movement of ore and coal or whether the miners are not paying attention to their traffic situation. I am rather of the opinion, from other information that I have received, that there are many discriminations on rates on mineral products that should be taken up. I know that some of the coal companies have taken up rate matters quite in detail, but I think many operators neglect their traffic questions. By publishing traffic news pertaining to the mining industry some may be reminded to straighten up their own rates.

Then there is the Treasury Department. The Customs Division and the Bureau of the Mint and other Bureaus develop some news.

The Department of Commerce is gathering a huge volume of valuable statistics. It receives many reports from foreign countries where mining is conducted.

There is a world of information in Washington and we could devote very profitably some more space to it, but we have been limited, of course, by the lack of money.

Mr. Morrison: I think, Mr. President, that the field is very well covered, but there are other sources of information which I think should be taken care of. I think a good deal more emphasis should be put on customs decisions on ores that are coming into our country.

Mr. Paul Wooton: Yes, sir, I think that could be done very profitably

Mr. Morrison: There was a very fine question just decided by the Board of Appraisers. If you could cover those things everybody using or dealing in ores would know about it. I think the Bureau of Standards, which has not been mentioned.——

Mr. Paul Wooton: Yes, we keep an eye on the Bureau of Standards.

Mr Morrison: ——— should be a source of information. I think the Forest Service of the Department of Agriculture, with all of its withdrawals, should be a source of information. I think there is in this country a growing interest in the affairs at Washington, not only on the part of individuals, but on the part of associations like the one I am connected with. I find that we have rather ramified interests. Now, the advance information of the intended publication of a document by the Bureau of Mines, which I get, is immediately answered by an inquiry to the Bureau of Mines to list me for that document, so that the moment it is out I get it. If I did not have that source, the MINING CONGRESS JOURNAL, I would naturally get a postal card from the Bureau some time later and I would be a month behind. People nowadays must not be a month behind, but must be up to the minute. So that I think really it is a great work and I think your sense of news, which is very well cultivated, is leading you into a real field of usefulness. So the remarks I made before I stand by. I stand by the further remark I made in regard to advertising.

Mr. Paul Wooton: If there are any further questions you desire to ask I would be very glad to answer them. Of course, I have not attempted to list all of the sources of information in Washington. I watch the Treasury decisions Mr. Morrison mentions and you will occasionally see that we have something from the Forest Service.

IRON RECORDS SMASHED

The January first estimates of shipments of iron ore from the mines during 1916 are 75,500,000 gross tons, compared to 55,493,100 tons for 1915, according to Ernest F. Burchard of the United States Geological Survey, Department of the Interior. Not only are these record-breaking figures, but the ore sold for $178,935,000, an increase of over $77,000,000 compared with 1915. Ore in stock at the mines approximates 10,486,000 gross tons, compared with 13,748,000 tons in 1915.

Production of pig iron also made a record in 1910 with a total of over 39,000,000 gross tons, compared with 29,916,213 tons in 1915.

FACTS AS TO OIL OCCURRENCE EXPLAINED NON-TECHNICALLY

The following non-technical explanation of facts as to oil occurrence is made by the Geological Survey:

"Oil occurs in porous rocks at various depths; generally the porous rocks are sandstone, but in a few places limestones have furnished oil. Porous beds, even when they are included in formations that may be oil-bearing, do not generally contain oil in large aggregations or pools except in places where they have been bent into more or less definite folds, when the oil if present is usually in the upward folds or anticlines and domes. There is no way of certainly determining that oil exists beneath the surface of the ground, in large quantities in any proven area, except by drilling. Films of oil on water, oil seeps or springs, gas emanations, asphaltic deposits, and rocks saturated with oil or emitting the odor of petroleum are favorable indications of the presence of oil or gas or both in rocks below or near by. They do not prove, however, that these substances exist in paying quantities or indicate the depth at which they occur. Thin films of oil on the surface of water in bogs or marshes may result from the decay of organic matter at the surface: also films of iron oxide, which accumulate in such places, may be mistaken for oil, and such occurrences should be carefully distinguished for actual oil seeps."

Preliminary estimates by John D. Northrop, of the United States Geological Survey, Department of the Interior, indicate that the quantity of crude petroleum produced and marketed in the oil fields of the United States in 1916 was 292,300,000 barrels. This quantity is greater by 4 per cent than the corresponding output in 1915, which reached the record-breaking total of 281,104,104 barrels. Mr. Northrop estimates that 38 per cent of the 1916 total came from the Oklahoma-Kansas field, 30 per cent from California, and the remaining 32 per cent from the Appalachian, Lima-Indiana, Illinois, north Texas, north Louisiana, Gulf coast, and Rocky Mountain fields.

FRANKLIN FURNACE MINES NEARLY DOUBLE OUTPUT

The great demand for spelter of high quality during the war has resulted in a notable increase in the zinc output of the Franklin Furnace mines. The output almost doubled, from 74,253 tons of recoverable zinc in 1914 to 136,042 tons in 1915. New shafts were sunk at the Franklin and Sterling mines and a new mill was built at the Sterling mine.—(Extract from the Mining Congress Convention paper of C. E. Siebenthal.)

Copies of the Supreme Court opinion in the Minerals Separation case may be secured from the American Mining Congress, Munsey Building, Washington, D. C. Price 10 cents per copy.

NEVADA PRODUCTION EXCEEDS $52,000,000 DURING 1916

The value of the gold, silver, copper, lead, and zinc from the mines of Nevada in 1916, was approximately $52,475,000, according to the preliminary figures of Victor C. Heikes, of the United States Geological Survey, Department of the Interior. This total represents an increase of nearly $18,000,000, or about 52 per cent, above the corresponding figure of 1915, which was $34,551,436. There were large increases, and record productions, made in copper, lead, and zinc, but there was a slight decrease in silver and a large decrease in gold.

The mine output of gold was valued at approximately $9,000,000 in 1916, a decrease of 22 per cent from the output of 1915, which was $11,404,300. The gold output from copper ore was increased, but that from amalgamation and cyanide mills was less in many of the camps. The Pittsburgh-Silverpeak mill, in Esmeralda County, was dismantled, and the Buckhorn, in Eureka County, was closed down. Both of these were important producers in past years. The Goldfield Consolidated, which is the most important gold producer of the State, was treating approximately 30,000 tons of ore per month. The output, however, was considerably less than in former years. A large flotation plant was being added at this property. The Jumbo Extension doubled its ore output, shipping from 2,000 to 3,000 tons per month. Shipments were also made from the Atlanta, and flotation concentrates by the Nevada Metal Extraction Co. One of the most important additions to the gold and silver production was from the operations of a cyanide mill at the Elko Prince property at Midas. Operations at Seven Troughs, National, and Round Mountain were somewhat less than in the preceding year. From Searchlight, in Clark County, ore and precipitates were shipped, and at Rawhide, in Mineral County, the Nevada New Mines acquired the Black Eagle property and operated two mills. At Aurora there was also increase in gold output.

The mine production of silver was about 13,680,000 ounces, which represents a decrease from 14,459,840 ounces in 1915. The value of this output, however, on account of the higher price of silver, increased from $7,331,139 to about $9,000,000 or 23 per cent. The silver output comes chiefly from the Tonopah district, where there was a marked decrease. In 1915 the district produced 516,337 tons of ore, $2,228,983 in gold, and 10,171,374 ounces of silver. In 1916 the district produced approximately 448,000 tons of ore, $1,941,000 in gold, and 8,884,000 ounces of silver. The largest producers were the Tonopah Belmont, Tonopah Extension, Tonopah Mining, Jim Butler, West End, Montana Tonopah, Halifax Tonopah, and Tonopah Midway. The Rescue Eula and Cash Boy were new producers. At the Tonopah Extension property ten stamps were added to the mill equipment. In the Rochester district, of Humboldt County, there was an increase in both gold and silver production from mill operations at the Nevada Packard and the Rochester Mines Co., each treating 100 tons a day. It is planned to double the capacity of the plant of the Rochester Mines Co. In the Comstock district, of Storey County, there was an increase of approximately 60 per cent in the value of the gold and silver output. The production in 1915 was valued at $378,731. The Union Consolidated mine was the most important producer, shipping ore to the Mexican mill. Other producers were the Ophir, Sierra Nevada, Andes, Chollar-Potosi, Comstock Phoenix, and Jacket-Crown Point-Belcher mines. The Yellow Jacket mill was run principally on dump ore, particularly after the Belcher mine was closed on account of fire on the 1400-foot level. In the north end of the territory, water is being lowered from the 2700 to the 2900-foot level, which will open up considerable new ground. In Churchhill County, the mills of the Nevada Hills and Nevada Wonder were both operated throughout the year, and no great change was made in production of gold or silver. Some silver was contributed by the Monitor Belmont flotation plant at Belmont, in Nye County.

The mine production of copper increased from 68,636,370 pounds in 1915 to over 103,000,000 pounds in 1916, an increase of nearly 35,000,000 pounds. The value of the copper increased from $12,011,365 to about $28,120,000, or 134 per cent. The greatest increase was due to the operations of the Nevada Consolidated Copper Co., at McGill, in White Pine County. During the first three quarters of the year, the plant treated nearly 3,000,000 tons of low-grade copper ore and produced 67,836,688 pounds of copper. Ore was also treated from the Giroux property. In Lyon County, near Yerington, there was great increase in the shipment of copper ore, especially from the Nevada Douglas property. The latter half of the year the 250-ton leaching plant was operated. Although the Mason Valley smelter was idle, a 10-ton leaching plant was operated, treating ore from the Montana-Nevada mine. At the end of the year it was planned to operate again the Mason Valley smelter. A large increase in copper ore shipments came from the Santa Fe and Silver Star districts, in Mineral County, from mines in the vicinity of Luning and Mina, which were shipping at the rate of 1,600 tons per month. Shipments were also made from Battle Mountain district, in Lander County.

The mine production of lead increased from 16,637,277 pounds in 1915, to 23,466,000 pounds in 1916. The value of the output increased more than $800,000 or 104 per cent over that of 1915, which was $781,952. A considerable part of this production came, as in former years, from the mines of the Yellow Pine district, in Clark County. The Prince Consolidated, at Pioche, greatly increased ore shipments, and a considerable output came from the Uvada property. Other important lead shipments were made from the Groom mine, in Lincoln County, Nevada Bunker Hill property, in Elko County, and the Union Mines, in Eureka County. At Eureka, considerable ore was shipped from the Richmond-Eureka and California Mining Co. property.

The mine production of zinc was approximately 34,739,000 pounds, an increase of over 10,000,000 pounds from that of 1915. There was a greater increase in the value, from $3,022,680 to $4,759,000 or 57 per cent. Over 90 per cent of the output came from the Yellow Pine district, in Clark County, very largely from the Yellowpine and Potosi mines. Other important shipments of zinc ore or concentrates came from the Amalgamated Pioche property, in Lincoln County, and the Polar Star property, operated by the Nevada Zinc Mining Co., in Spruce Mountain district, Elko County.

Incomplete records of dividends paid by Nevada mining companies during the year amounted to $11,348,000. The greater part of this was paid by the Nevada Consolidated. Other contributors were the Tonopah Belmont, Tonopah Extension, Tonopah Mining Co., Yellow Pine, Prince Consolidated, Jumbo Extension, Nevada Wonder, Jim Butler, West End, Seven Troughs Coalition, and Goodsprings Anchor.

IDAHO MINES INCREASE OUTPUT BY 41 PER CENT

The value of the mine output of gold, silver, copper, lead, and zinc in Idaho in 1916, according to the preliminary estimate of C. N. Gerry, of the United States Geological Survey, Department of the Interior, was over $47,000,000, an increase of 41 per cent from $33,328,930 in 1915. There was a record output of silver, lead, and zinc and increased production of copper, but a slight decrease in gold.

The mine production of gold decreased from $1,179,731 in 1915 to $1,098,000 in 1916, a decrease of 7 per cent. Part of the decrease was due to the smaller placer output from dredging. The gold output from copper ore, lead ore, and lead-zinc ore, however, was increased. The most important dredge operations were those of the Boston-Idaho, Boise County, and the Kirtlet Creek and Bohannon Bar, Lemhi County. Work progressed at deep, gold mines at Atlanta, Elmore County, and in Custer County. Mills were active at the Nellie mine at Horseshoe Bend and the Lucky Boy mine, Boise County.

The mine output of silver increased from 11,769,128 ounces in 1915 to approximately 12,500,000 ounces in 1916. As the price of silver was much above that of 1915, the value of the output increased from $5,966,948 to $8,225,000, or 38 per cent. There probably would have been a greater increase in the silver production from lead and lead-zinc ores had it not been for the peculiar smelting conditions during the year, as the Northport smelter, which received the Hercules ore, was being completed, and the Bunker Hill & Sullivan Co. at Kellogg was beginning smelter construction. Each of the following mines produced more than a million ounces of silver: Hercules, Bunker Hill, Morning, Greenhill-Cleveland, Caledonia, and Hecla.

The mine production of copper increased from 6,978,713 pounds in 1915 to over 8,000,000 pounds in 1916. This represents an increase from $1,221,275 to $2,184,000 or 79 per cent in value, due to the better price. A large part of the copper output came from the Empire Copper and adjoining properties near Mackay, in Custer County, from which greater shipments were made. In Shoshone County production came from the Caledonia, the Horst Powell mine, National, Richmond, and various properties producing principally lead ore. The Lost Packer Co., in Custer County, constructed a flotation plant, but did not operate the smelter.

The mine output of lead increased from 345,999,466 pounds in 1915 to approximately 362,000,000 pounds in 1916. The value of the lead output increased from $16,261,975 to $24,616,000, or about 51 per cent. There were important increases at the Morning, Hercules, Hecla, and Interstate-Callhan mines. The Hecla opened a new and important ore body, and the Morning is said to be developing into a larger mine at depth. The Bunker Hill output was normal, but the output of the lead mines of the Yreka district was generally less than 1915, especially as the Stewart ceased shipments early in the year. The lead smelting plant at Northport, Wash., was operated especially on Hercules ore and concentrates, from March to the end of the year. At Kellogg, foundations for the new 900-ton lead plant were being laid, and Idaho will soon have a smelting plant in the Coeur d'Alene region. In Lemhi County, lead shipments came from the Pittsburgh Idaho, Latest Out, and Gilmore; in Fremont County, from the Wilbert, and in Bonner County, from the Idaho Continental, where a new mill was completed. Mills were constructed at the Silverado, Alhambra, Hypotheek, constitution, and Ray Jefferson, and the Rex mill was improved. The Coeur d'Alene region made shipments of concentrate and crude ore at the rate of 45,000 tons per month, of which about 35,000 tons were lead material and the remainder zinc ore and concentrate.

The mine production of zinc increased from 70,152,234 pounds in 1915 to approximately 80,000,000 pounds in 1916. The value of the output increased from $8,699,001 to about $10,960,000, or 26 per cent. The Consolidated Interstate-Callahan was, as formerly, the most important producer, and shipped 68,000 tons of zinc ore and concentrate aside from lead product, and the Success contributed nearly the same amount of spelter. Other important producers were the Morning, Greenhill-Cleveland, and Frisco mines. Smaller shipments were made from the Terrible Edith, Paragon, Murray Hill, Highland Surprise, Constitution, Hercules, Colonial, Douglas, and Black Hawk, in Shoshone County, and the Minnie Moore, Nay Aug, Boston-Idaho, and North Star Triumph, in Blaine County, where a new mill was completed. The Ray Jefferson Co., joining the Interstate Callahan, completed the mill and made concentrates which were stored, awaiting the completion of the Beaver Creek branch of the O. W. R. & N. Railroad.

HOLMES MEMORIAL VOLUME EXCITES FAVORABLE COMMENT

No public library is complete without having a copy of the memorial volume issued by the American Mining Congress as a tribute to the late Dr. Joseph A. Holmes, the first director of the Bureau of Mines. The work should be in the private library of every individual interested in mining. Extracts from a few of the letters, commending the volume, give an idea of its value:

WASHINGTON, D. C.,
December 27, 1916.

"I am delighted, as all his friends must be, with the volume published to the memory of Prof. Holmes by the American Mining Congress. It constitutes a most worthy fulfillment of a most worthy purpose. All who are concerned in it have good reason to be proud of it."

(Signed) GIFFORD PINCHOT.

TERRE HAUTE, IND.,
December 26, 1916.

"I wish to acknowledge receipt of the very handsome copy of our mutual friend, Dr. Holmes, Memorial Volume and after looking through it, I think it is a most suitable volume and the sentiments therein expressed I can certainly endorse and I feel that it is a great pity that Dr. Holmes could not live longer to finish the work that he so well begun and I appreciate being one of the number to be honored with a copy of this work."

(Signed) J. C. KOLSEM.

GILLESPIE, ILL.,
December 25, 1916.

"Just a line to inform you that I have received by express a copy of the Holmes Memorial Volume and it certainly is fine. I wish to congratulate you and those responsible for this volume, and I think its contents very appropriate to the memory of Dr. Holmes. I believe this method of showing our appreciation of Dr. Holmes' life work will prove better than a monument of stone, granite or metal. I assure you that I would not part with my volume for any price."

(Signed) JOHN P. REESE.

SEATTLE, WASH.,
December 20, 1916.

"The handsomely bound volume containing the tributes paid to the late Dr. Joseph A. Holmes reached me yesterday.

"It is very inspiring to know that a man's services are appreciated by his fellowman, as indicated by the collection of tributes contained within this volume.

"Dr. Holmes had very little regard for publicity, only in so far as it helped his great work in the uplifting of the miner.

"This volume, to me, is the very best Christmas present that could possibly reach me, and I will spend several enjoyable hours reading the kind expressions of the men who knew Dr. Holmes as you and I knew him."

(Signed) GEO. WATKIN EVANS.

NEW YORK,
December 22, 1916.

"I beg that you will accept my congratulations on the excellent example of typography and binding of the volume issued by the American Mining Congress as a Memorial to the late Dr. Holmes. It is fitting that the beauty of Dr. Holmes life should have been perpetuated by the testimony of his friends and co-labors in science and that the Congress in which he took such a deep and sympathetic interest during his busy career should have taken unto itself the duty of recording for posterity the deep love and affection in which he was held by his contemporaries."

(Signed) WALTER DOUGLAS.

SCRANTON, PA.,
December 22, 1916.

"I was pleased the other day to receive a copy by express of a very handsome volume, Memorial of the late Dr. Jos. A. Holmes. It appeals to me as perhaps the most appropriate, satisfactory and enduring tribute which members of the Mining Congress could give as a testimonial of their esteem, and appreciation of the character and worth of a great man, and a most efficient and faithful public servant."

(Signed) WM. GRIFFITH.

NEW YORK,
December 22, 1916.

"I have received the Holmes Memorial Volume and was delighted with it. No one could wish a more complete and satisfactory appreciation than is contained in this book. The beauty of it is that it is not the expression of opinion of any one man or any one organization. The subject is approached from many sides and the life and services of the late Prof. Holmes are viewed from many different angles. Together they sum up the man and his work in a way that is unique and valuable. I consider myself fortunate to have been permitted to join in this symposium."

(Signed) A. R. LEDOUX.

NEW YORK, N. Y.,
December 22, 1916.

"I have just received the Holmes Memorial Volume which you sent me and I want to sincerely congratulate you upon it. It is a splendid piece of work and would, I am sure, meet with the admiration of Dr. Holmes himself, as it certainly does with mine."

(Signed) BRADLEY STOUGHTON.

CHICAGO, ILL.,
December 21, 1916.

"I have just received my copy of the Holmes Memorial Volume, and am greatly pleased with the contents and binding. It is indeed a valuable addition to my library, and I hope it will furnish inspiration to the coming generation of mining men."

(Signed) CARL SCHOLZ.

PITTSBURGH, PA.,
December 23, 1916.

"I received the copy of the Holmes Memorial Volume, which was produced under the auspices

of the American Mining Congress, in good condition.

"I wish to take this occasion to say that I prize this volume very highly, not only because it memorializes our dear friend, Dr. J. A. Holmes, but also because of the splendid expressions of esteem therein collected and preserved, given by those who knew Dr. Holmes intimately.

"The book itself is a work of art from every viewpoint, and one which those who have it will appreciate more highly as the days go by and the work of Dr. Holmes comes to complete fruition."

(Signed) S. A. TAYLOR.

CHICAGO, ILL.,
December 22, 1916.

"I have just received my copy of the Holmes Memorial volume and I want to express my appreciation of it. It is a great deal of pleasure to read tributes of our mutual friend, Dr. Joseph A. Holmes, and it certainly shows the great esteem which his personal friends held for him. My one regret is that more of these things could not have been said to Dr. Holmes during his lifetime."

(Signed) J. K. DERING.

CLEVELAND, OHIO,
December 22, 1916.

"The writer has received the copy of Holmes Memorial Volume and appreciates the same very much indeed. The writer has met Dr. Holmes quite a number of times, and learned of the great value of the work he has done for the mining cause. We are sure that you could have done nothing better than to issue this splendid volume, and are sure this action will meet with the wishes of Dr. Holmes. He has indeed done much good for humanity."

(Signed) C. O. BARTLETT.

OREGON DOUBLES ITS OUTPUT OF SILVER

Preliminary estimates of the production of metals from Oregon mines in 1916, by the United States Geological Survey, Department of the Interior, show increases over 1915 for gold, silver, and copper, and a decrease for lead. The output of gold in 1915 was $1,861,796 and the estimated output for 1916 is $1,900,000, an increase of $38,000. The output of silver in 1915 was 117,947 ounces, and the estimated output in 1916 is 227,500 ounces, or 109,500 ounces more. The output of copper in 1915 was 451,172 pounds, and the estimated output in 1916 is 2,527,000 pounds, an increase for 1916 of 2,076,000 pounds, and the output of lead in 1915 was 62,957 pounds, as compared with 22,000 pounds in 1916, or 41,000 pounds less. These preliminary figures are compiled by Charles G. Yale, of the San Francisco office of the Geological Survey.

The increase in gold is merely nominal, but that of silver has about doubled. The most notable increase is in the quantity of copper, an increase caused by the incentive offered by high prices.

There are less than 100 productive metal mines in Oregon, and the number of placers is about double that of the deep mines. However, two-thirds of the gold output and virtually all that of the other metals, is derived from deep mines. No very productive new properties have been opened during the year. The entire output of the deep mines is derived from less than 160,000 tons of ore, having an average value of about $9 a ton. Baker is still the most productive county in the State, yielding annually nearly 90 per cent of all the gold. The Cornucopia and the Baker mines, in the Cornucopia district, Baker County, are the most productive deep mines in oregon. Other large, deep mines in Baker County are those of the Commercial Mining Co. (Rainbow mine), at Rye Valley, in the Mormon Basin district; the Columbia Gold Mines Co. at Sumpter, Cracker Creek district; and of the Homestead-Iron Dyke property, at Copperfield, Iron Dyke district.

CURRENT YEAR PROMISES THE BEST SAFETY RECORD

"I am pleased to be able to tell you that while 1915 was the safest year ever known in coal mining in the United States, the figures for the first eight months of 1916 indicate that the 1915 record will be eclipsed. For these eight months of this year there are seventy-two less fatalities than for the same months of 1915, or a reduction of 5 per cent from the splendid record of that year." (Extract from address of Van H. Manning at the Mining Congress Convention.)

UNIFORM LAWS ONLY MATTER OF SIMPLIFICATION

"To the engineer, uniform mining laws means simplification which is one of the most desirable features in any engineering work. The physical conditions of the coal mining fields of the United States are not so radically different but that competent body of men can draft a set of laws, or by synthetic analysis of those now on our statute books, set up a code to fit, and all mining engineers would be made happy thereby." (Extract from address of J. A. Garcia at the Mining Congress Convention.)

FUTURE DEMANDS SHOULD CONTROL CONSERVATION

"In the conservation of our resources, the State geologist possibly above all others, should look into the future and be controlled by its prospective demands. Our rapidly increasing population; the near occupancy of all our farming and pastoral lands; the possible, even probable, depletion of the soils, natural fuels and useful minerals—all these should have his most serious attention. In those States where forestry legally comes within the duties of the State geologist, an additional responsibility of the greatest importance and one that often requires much diplomacy is placed upon him." (Extract from address of A. H. Purdue at the Mining Congress Convention.)

LEAD OUTPUT IS INCREASED TEN PER CENT OVER 1915

The lead industry in 1916 made good gains in output, both in mining and smelting. The lead content of ore mined in the United States in 1916 was about 622,000 short tons, compared with 561,639 tons in 1915, an increase of 60,000 tons, or over 10 per cent. The average price of lead in 1916 was so much higher than in 1915 that the increase in value of the mine output of lead was about 50 per cent.

The Northport Smelting & Refining Co. in March blew in the remodeled smelter at Northport, Wash., and later in the year added two more lead furnaces, making four in all. The operation of the smelter gave an impetus to the production of lead in Washington, the output of which was four times as large as ever before. The Bunker Hill and Sullivan smelter was started at Kellog, Idaho, and is expected to be in operation in the spring of 1917.

The State that recorded the largest gain in lead production was Missouri, which made an increase of over 25,000 tons. Good gains were also made by California, Idaho, Nevada, Utah, and New Mexico.

The following estimates have been compiled by C. E. Siebenthal without change from reports made to the United States Geological Survey, Department of the Interior, by all the lead refineries and soft-lead smelters in operation during the year. These reports give records of the actual production for the first 10 or 11 months and estimates of the output for the remainder of the year. The statistics of imports, exports, and lead remaining in warehouse have been made up from the records of the Bureau of Foreign and Domestic Commerce for 10 or 11 months and estimates for the remainder of the year.

RECORD BREAKING PRODUCTION

The production of refined lead, desilverized and soft, from domestic and foreign ores in 1916 was 579,600 tons, worth at the average New York price $78,826,000, compared with 550,055 tons, worth $51,705,000, in 1915, and with 542,122 tons, worth $42,286,000, in 1914. The figures for 1916 do not include an estimated output of 21,800 tons of antimonial lead, worth approximately $4,283,000, compared with 23,224 tons in 1915 and with 16,667 tons in 1914. Of the total production, desilverized lead of domestic origin, exclusive of desilverized soft lead, is estimated at 324,000 tons, against 301,564 tons in 1915 and 311,069 tons in 1914; and desilverized lead of foreign origin at 21,400 tons, compared with 43,029 tons in 1915 and 29,328 tons in 1914. The production of soft lead, mainly from Mississippi Valley ores, is estimated at 234,200 tons, compared with 205,462 tons in 1915 and 201,725 tons in 1914. The total production of desilverized and soft lead from domestic ores was thus about 558,200 tons, valued at $75,915,000, compared with 507,026 tons, valued at $47,660,000 in 1915, a gain of 51,000 tons. Of this gain in domestic production, about 29,000 tons was made in soft lead and 22,000 tons in domestic desilverized lead.

In consequence of the great demand for lead a considerable quantity of secondary lead (about 7,000 tons) and secondary antimonial lead (over 5,000 tons) was recovered at the regular smelters.

The final figures for the production of soft lead will show an increase of a few thousand tons over those here given, for the reason that the smelters and refiners of argentiferous lead undoubtedly treated more or less soft lead from the Mississippi Valley which in their preliminary estimates is not distinguished from silver-lead ores.

APATHY OF PLACER MINERS MAY UPSET PLANS OF SURVEY

Out of 3,200 requests which were sent out by the Geological Survey asking for certain necessary data concerning placer mines, replies have been received from only 22 per cent. It required two requests to bring in that many replies. To the original request only 19 per cent of those receiving it replied. A second request was sent to 1,306 operators.

This is taken to indicate that the placer industry is not concerned deeply in knowing the details of this class of mining operations. The lack of interest that has been shown may result in the abandoning of the original plan of the Survey to secure new data regarding placer mines along the lines of the exhaustive statistics which are so eagerly demanded by other classes of mining operations.

It is very evident that complete data regarding the placer industry can be obtained only by personal investigations by Survey men. This will entail considerable expense and much loss of time, and while it has not been decided, it is not probable that other work will be delayed to furnish information to a class of operators who are evidently uninterested in it.

FEW MINERS KILLED IN ACCIDENTS IN 1915

"Great progress has been made in coal mining. The statistics for the year 1915 show these rather important conclusions.

"The actual number of men killed was the lowest in the last eight years.

"The death rate for each 1,000 men employed was the lowest in the last sixteen years.

"The number of tons of coal produced for each miner killed was the largest in the entire history of coal mining in the United States." (Extract from address of Van H. Manning at the Mining Congress Convention.)

A CARTOONIST'S CONCEPTION OF
GEO. OTIS SMITH
at the Mining Congress convention

Zinc in Wisconsin

Under the stimulus of great demand and high prices for zinc developments in Wisconsin are being directed toward larger size of plants and greater output, better equipment, and higher recovery.—(Extract from the Mining Congress. Convention paper of C. E. Siebenthal.)

NORTHWEST CONVENTION TO BE HELD IN SPOKANE, FEB. 19 TO 25

The 1917 Northwest Mining Convention will be held in Spokane, February 19 to 15.

This is the most important mining event in the Northwest and is attended by mining men from the Northwestern States, British Columbia and Alaska.

Exhibits of ores, minerals, machinery, devices and supplies are made and there are four days of sessions devoted to the mining industry.

The engineering societies hold technical programs; there are stereopticon lectures for evenings and the entertainment of visitors by a special committee.

WETTING ALONE NOT CERTAIN PREVENTIVE OF EXPLOSION

During the past two months, tests have been made at the experimental mine of the Bureau of Mines, at Bruceton, Pa., on mixtures of Pittsburgh coal, shale, and water to determine what proportions of shale and water are necessary to make the coal dust inert. The tests were made under the standard conditions for explosion tests. The explosions are started by a 50-foot ignition zone of (dry) pulverized Pittsburgh coal dust which is ignited by a blown-out shot of 4 pounds of black powder. The mixture to be tested is loaded along both entries for distances of 300 and 350 feet from the ignition zone.

The coal was tested in three sizes: (1) Pulverized, of which nearly all would pass through 100-mesh and 75 to 85 per cent through 200-mesh; (2) 20-mesh coal, of which 40 per cent would pass through 200-mesh; and (3) 20-mesh coal, 20 per cent of which would pass through 200-mesh. The percentage of water in the mixture was kept constant at either 10 or 20 per cent and the proportion of shale increased until the mixture would not propagate flame. The coal, shale, and water were thoroughly mixed before being placed in the mine.

Tests were also made with mixtures of coal dust and water, without shale dust. In one test pulverized coal mixed with more than 23 per cent water was used. This mixture was wet enough to ball in the hand. At the time this test was made all the surfaces of the mine were very wet, the roof and the ribs dripping with moisture. A strong propagation of flame was obtained, the pressure developed being over 50 pounds per square inch at some points.

The 20-mesh coal of which 40 per cent passed through 200-mesh would not propagate flame when mixed with 20 per cent water, but the coarser grade 20-mesh, of which 20 per cent passed through 200-mesh, would propagate flame when mixed with 15 per cent water.

These tests indicate that only the most through and constant wetting of a mine would be effective unless there is a large proportion of shale dust present. In winter the dust dries out so rapidly that where the dust is nearly pure coal wetting alone would probably not be a sure means of preventing a dust explosion.

GREATEST COAL PRODUCTION

Coal production records were smashed in 1916, when the output was around 597,500,000 tons, compared with 570,000,000 tons, the previous high record established in 1913. The quantity of bituminous coal mined was 509,000,000 tons, an increase compared with 1915 of 66,500,000 tons, or 15 per cent, according to estimates by C. E. Lesher, of the United States Geological Survey, Department of the Interior. The quantity of Pennsylvania anthracite was about 88,312,000 net tons, a decrease of 600,000 tons.

WASHINGTON DOUBLES ITS OUTPUT OF THE RED METAL

The value of the mine output of gold, silver, copper, lead, and zinc in Washington increased from $744,033 in 1915 to approximately $2,018,000 in 1916, according to the preliminary estimates of C. N. Gerry, of the United States Geological Survey. This is the record output of the State in value. On account of the increase in the prices of the various metals the value of the output was nearly three times that in 1915. The quantities of the metal produced also notably increased.

The mine production of gold increased from $391,419 in 1915 to about $540,000 in 1916. The greater part of the gold was derived from the siliceous ore shipped to smelters from the Republic district of Ferry County. The cyanide mills were not operated.

The silver output of Washington mines increased from 255,837 ounces in 1915 to about 315,000 ounces in 1916. Owing to the advance in average prices of silver, the value of the output increased from $129,709 to over $207,000. The greater part of the silver came from copper ore and concentrates shipped from the Chewelah district, in Stevens County; a smaller amount was derived from siliceous ores mined in the Republic district.

COPPER MORE THAN DOUBLES

The mine output of copper increased from 1,020,926 pounds in 1915 to about 2,569,000 pounds in 1916, thereby more than doubling the former output. Since the average price of copper was more than 27 cents a pound in 1916, the value of the copper increased from $178,662 to over $701,000. Thus copper is now of more importance than gold, which was formerly the principal metal of the State. A large part of the copper output came from the Chewelah district, especially from the United Copper mine. Approximately 10,000 tons of copper ore and concentrate were shipped from the district, and several new properties were added to the shipping list, including the Copper King, Blue Star, June-Echo, and Amazon. The Napoleon mine, near Marcus, was a large shipper of low-grade copper ore, and the Laurier mine, in Ferry County, contributed considerable ore. In the Loon Lake district, about 40 miles north of Spokane, in Stevens County, shipments of copper ore were made from March to the end of the year.

ENORMOUS INCREASE IN LEAD

The mine production of lead increased from 295,215 pounds in 1915 to about 4,937,000 pounds in 1916. The value of the output increased from $13,875 to about $336,000. This notable increase was due largely to the discovery of lead at the Electric Point mine, near Northport. The Bonanza mine at Bossburg also contibuted lead ore.

BIG INCREASE IN ZINC

The mine output of zinc increased from 244,906 pounds in 1915 to about 1,709,000 pounds in 1916, an increase of nearly 600 per cent. The value increased from $30,368 to over $234,000. In Pend Oreille County, the Lead Zinc Co., at Metaline, increased its output of zinc ore and concentrate, and it is now planned to increase further the capacity of the mill, which treated 100 tons a day. The Norman Mines Co., near Northport, also shipped considerable zinc carbonate. The mine, however, was closed at the end of October.

A marked impetus was given to mining in the Republic district, from which about 40,000 tons of siliceous ore were shipped to several smelters to be used as converter lining. The Surprise-Lone Pine-Pearl property was the largest shipper, the San Poil and Knob Hill following. Smaller shipments were made from the Hope, Rathfon Reduction Company, Tom Thumb, Ben Hur, and Mountain Lion. The Knob Hill was put in shape for production. The Surprise-Lone Pine-Pearl property was acquired by the Northport Smelting Co., and considerable ore was shipped to that plant in the last half of the year.

A modern lead smelting plant was operated at Northport from March to the end of the year. Though built primarily to reduce Idaho material it treated also custom ore from Washington.

PRESIDIO COUNTY FURNISHES MOST OF TEXAS SILVER

The output of Texas mines for eleven months of 1916 with the estimated output for December, as shown by preliminary figures reported by Charles W. Henderson, of the United States Geological Survey, Department of the Interior, amounted to $600 in gold, 680,000 ounces of silver, 50,000 pounds of lead, and 100,000 pounds of copper, as compared with $1,503 in gold, 675,473 ounces of silver, 219,298 pounds of lead, and 42,941 pounds of copper in 1915. The greater part of the output of silver came from the Presidio silver mine and cyanidation mill, in the Shafter district, Presidio County. Some silver and copper were produced in the Allamoore-Van Horn district, Culberson County, and some silver, lead and copper in the Sierra Blanca district, El Paso County.

BUREAU OF MINES TO PUBLISH GLOSSARY OF MINING TERMS

A glossary which will include all terms peculiar to mining is to be published by the Bureau of Mines as soon as the extensive compilation can be completed. This will probably require a year or more. This will be made the most complete work of this kind ever published. In addition to mining terms in English, an extensive list of the more generally used Spanish mining expressions will be included. The glossary will indicate where the terms are used, in case their use is provincial, and will cover all of the mining districts in the United Kingdom and in the United States.

Personals

C. W. Griswold, of the Associated Geological Engineers, has transferred his activities from Wyoming to Oklahoma. M. L. Fuller, managing engineer of the engineering division of the same organization, visited the New York office recently.

J. M. Wright, of the Raleigh Coal & Coke Company, of Cincinnati, was in Washington attending a meeting of the Winding Gulf Operators' Association, last month.

Prof. F. W. Clarke, chief chemist of the Geological Survey attended the meeting of the American Chemical Society in New York last week.

Dr. Chas. Parsons, chief of the Division of Mining Technology, of the Bureau of Mines, has returned from Europe, where he made a study of processes for extracting nitrogen from the atmosphere.

R. W. Pack of the Geological Survey has returned from extended work in the California oil fields.

F. C. Schraeder has returned to Washington after several months in Nevada and Idaho in the interest of the Geological Survey.

F. B. Van Horn of the Wrightsman Oil Company was in Washington recently.

The Hazard Coal Operators' Association will hold its annual meeting, at the Phoenix Hotel, Lexington, Ky., on January 9.

Irving T. Snyder, recently elected a director of the American Mining Congress, is spending some little time in California. He will return to Denver during the early part of this month.

Falcon Joslin, who has been spending some months in Alaska, is again in the East, and was a caller at the Mining Congress Office recently.

Lewis Titus, of California, is spending some time in Washington in interest of the oil claimants of California.

H. S. James, secretary of the Western Petroleum Refiners' Association, of Kansas City, Mo., was a caller at the Mining Congress headquarters last month.

J. F. Callbreath, secretary of the American Mining Congress, has returned to the Washington office after an extended trip in Colorado and the Middle West. Mr. Callbreath will leave the early part of the month to attend the meeting of the Colorado Metal Mining Association at Denver, and the Northwest Mining Association at Spokane.

Col. B. F. Millard, after attending the recent convention of the Mining Congress at Chicago, visited New York and Washington, spending several days at each point. While in Washington, he was a caller at the Mining Congress office.

Capt. Baird Halberstadt, geologist and consulting engineer, of Pottsville, Pa., when recently in Washington, called upon the secretary of the American Mining Congress.

Dr. Henry S. Drinker was in Washington last month attending a conference of the governing council of the National Conservation Congress, which was held with a view to making arrangement for its next meeting, which will probably be held in New Orleans. It is anticipated that this meeting will devote itself to a discussion of the waterways and drainage problems of the Mississippi valley.

COST OF PRODUCTION AND MARKET CONDITIONS CONTROL

"There are two compelling factors in determining your selling price: First, the cost of production; second, market conditions. What possibility has a coal operator, in the absence of cooperation, to possess accurate knowledge with respect to market conditions? None whatever. 'Market conditions,' generally speaking, consist of the prices at which all competitive coals are being sold. False reports as to the prices which are quoted by competing houses are widely current; and too often they receive credence, and efforts are made to meet prices which never existed; thus reducing the whole level of prices." (Extract from address of Ralph Crews, at the Mining Congress Convention.)

SAYS CHAOS REIGNS AS A RESULT OF THE WITHDRAWAL ORDERS

"Ever since the withdrawal order the conditions in the oil fields of California have been chaotic. Companies do not know what their rights are; suits by the Government have been commenced against some and receivers have been appointed.

"No new work is being done, great losses are being suffered, and bankruptcy faces many who but a few years before in the best of faith went upon government land under the mining laws of the country and risked their fortunes in an effort to discover oil in a locality that was most forbidding and discouraging. What is going to be done for these men? What relief should Congress give them in the Oil Leasing Bill now pending in the Senate of the United States? These are pressing questions. If this bill passes,

and there is every prospect that it will, the petroleum and gas lands owned by the Government will thereafter be leased to those offering the best bid therefor." (Extract from the address of Roy A. Bishop at the Mining Congress Convention.)

GEOLOGISTS DIFFER ON THEORIES OF ORIGIN OF OIL AND GAS

"Practically all geologists hold to the organic theory of the origin of oil and gas, but there are several eminent men among them who believe in the inorganic theory. The advocate of either theory is able to disprove the theory of the other to his own satisfaction, but is unable to conclusively prove his own. Consequently, in the absence of positive proof, when asked what is the origin of oil and gas, we must answer, we do not know. The interior of nature's laboratory is not open to inspection, and it is extremely doubtful if this question can be solved. We think, however, that the theory of its origin held by a geologist must to some extent influence his attitude of mind in attempting to locate deposit." (Extract from the address of J. C. McDowell at the Mining Congress Convention.)

Coke Report Out

The Geological Survey's report on coke for 1915 is now ready for distribution.

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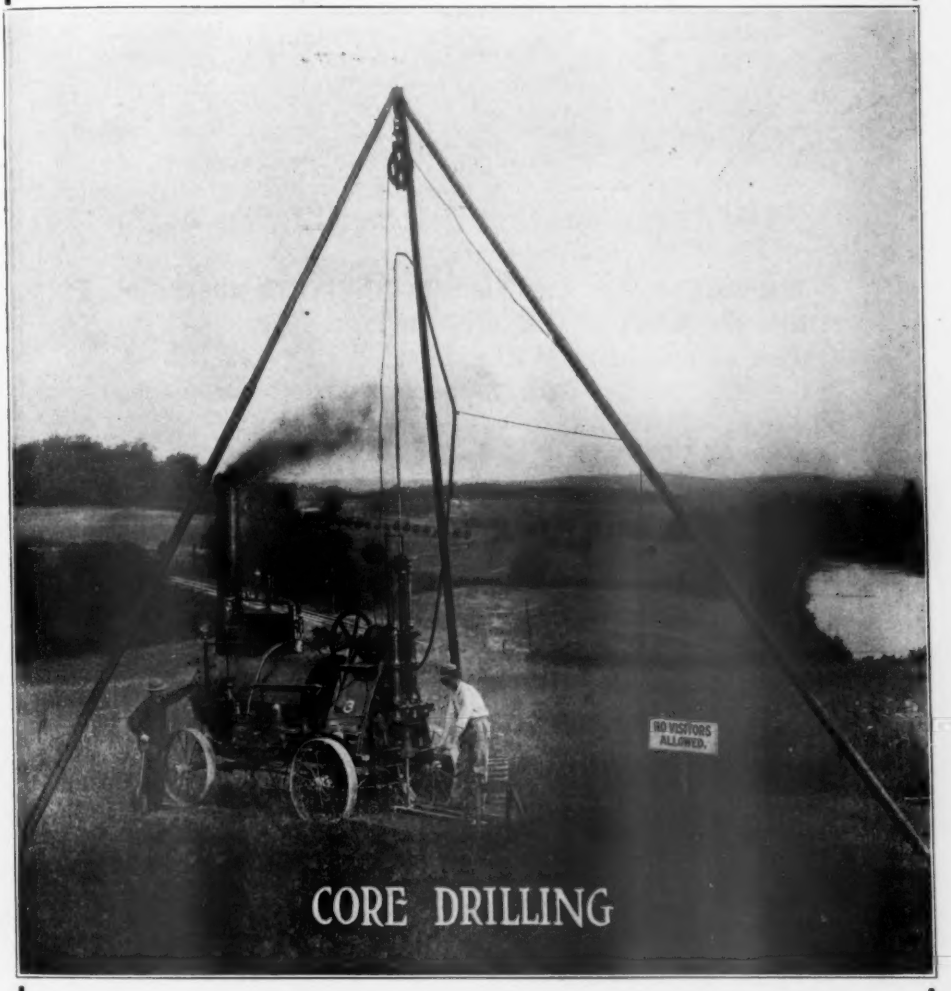

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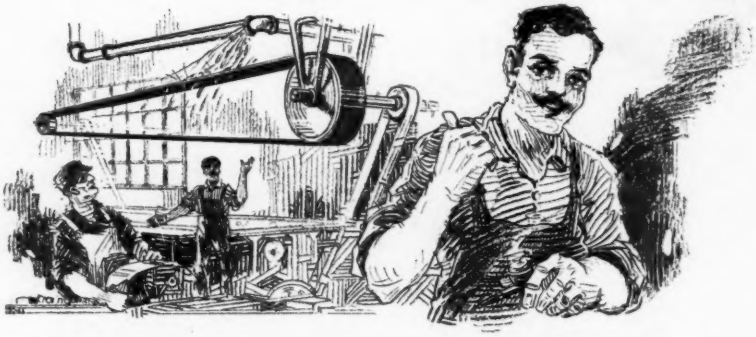

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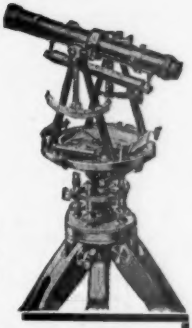

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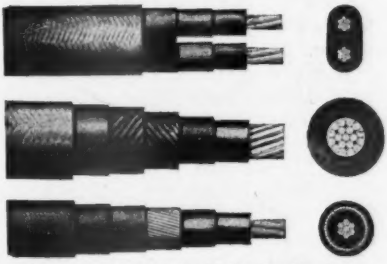

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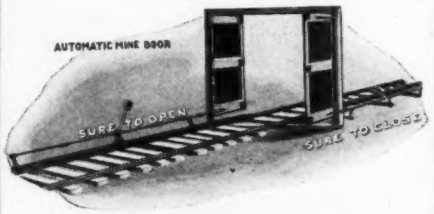

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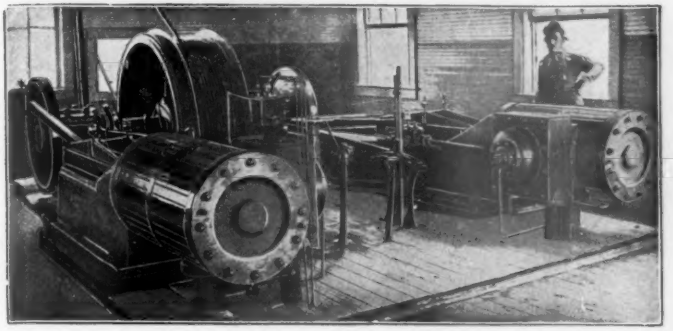

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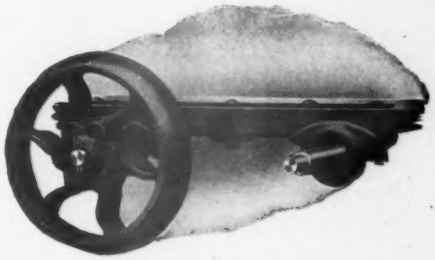

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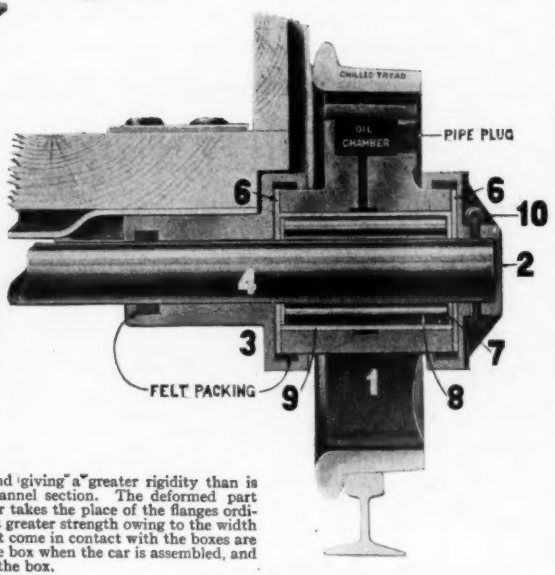

Is constructed with pressed steel channels that hold the boxes in perfect alignment, running all the way across the car and thus preventing them from getting out of line. It has the bolts running through the bottom of the car, going through the axle boxes, pressed steel channels and wooden bottom, and the heads are protected on the inside of the car by a washer also, which does not allow the bolts to wear the wood and cause the axle to get out of line. The pressed channels are not of the ordinary rolled type channel, but are made from ¼-inch plate, and the deformed part of the channel in the center gives it greater strength and also wider bearing on the bottom of the car, allowing the bolts to be placed further apart and giving a greater rigidity than is accomplished by the ordinary rolled channel section. The deformed part of the channel that is formed in the center takes the place of the flanges ordinarily used, and in addition to this gives it greater strength owing to the width of this deformed section. The flanges that come in contact with the boxes are driven down tight on either side of the axle box when the car is assembled, and there is no play between the channel and the box.

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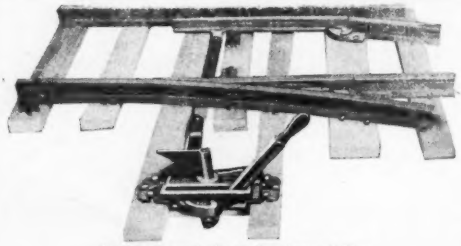

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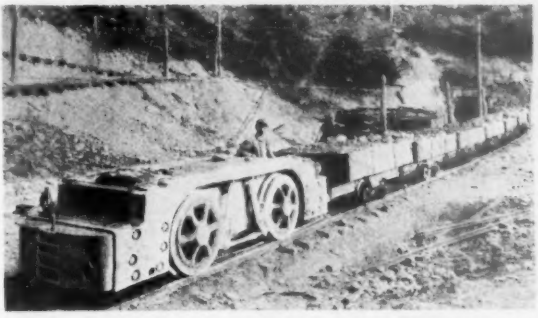

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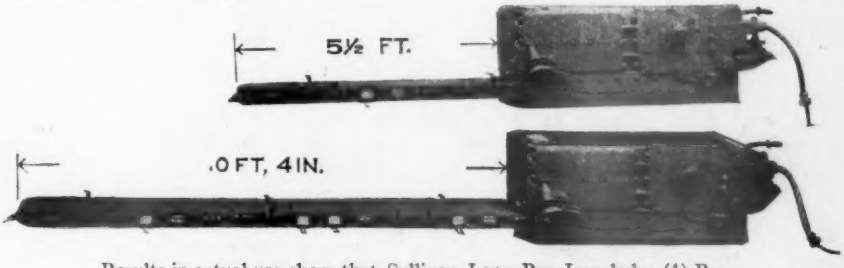

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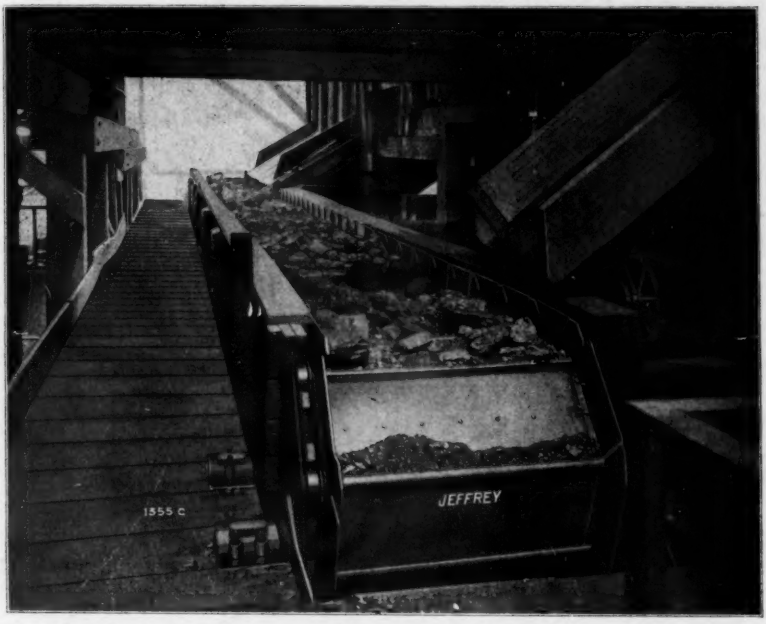

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